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For Ben^{ts} Travers's Esq

with the respects of his
former Pupil the
Author.

RESEARCHES
RESPECTING THE MEDICAL POWERS
OF
CHLORINE,
PARTICULARLY IN
DISEASES OF THE LIVER;

WITH
AN ACCOUNT OF A NEW MODE OF APPLYING THIS AGENT,
BY WHICH ITS INFLUENCE ON THE SYSTEM
CAN BE SECURED.

BY
WILLIAM WALLACE, M. R. I. A.

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ONE OF THE SURGEONS TO THE CHARITABLE INFIRMARY IN JERVIS-STREET;
SURGEON TO THE DUBLIN INFIRMARY FOR THE TREATMENT OF
DISEASES OF THE SKIN;
LECTURER ON ANATOMY AND SURGERY;
&c. &c.

“ Chlorine is now known to be an elementary body of the greatest activity, of the powers of which over diseases we are nearly in total ignorance.”

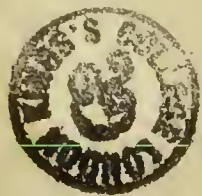
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Tom Hill



P R E F A C E.

NEARLY two years ago I addressed the profession, and particularly the medical attendants of hospitals, respecting the advantages which were likely to arise to the public from the establishment in charitable institutions, and from the general employment in private practice, of apparatuses for the application of medicine in the form of gas or vapour to the surface of the body. That publication was transmitted by order of the then Chief Secretary, the Right Hon. Charles Grant, to the surgeons of all the county hospitals, and to the inspectors and physicians of the prisons throughout Ireland; and, if I may be permitted to judge from the extent of the correspondence, and from the numerous inquiries, which have

thence resulted, the important object of my publication has been completely attained.

In the essay written on that occasion I refrained, for reasons therein mentioned, from communicating any of the particular results of my inquiries on this new mode of practice, with the promise, however, of soon again appearing before the public. To redeem that promise is, therefore, the object of this publication ; which, should the pressing avocations of a laborious profession permit, will, I hope, be only the first of a series on analagous subjects. Of the merits of the present essay it will be for others to judge. I may, however, be permitted to say, that the subject of it is evidently one of the first importance ; and, although its investigation has required very considerable labour, I shall be amply repaid, if it be found, by general experience, that I have discovered the means of rendering certain the operation of a remedy, which is admitted to be (on those rare occasions when it can be made to act on the system) extremely valuable in the treatment of hepatic or bilious diseases : an extensive

class of maladies, for the relief of which mercury, in some form or other, has hitherto been almost our only resource.

I take an opportunity, in this place, of alluding to a subject, to which the particular attention of such as are solicitous about the advancement of "*Atmidiatrics*" cannot be too anxiously directed. There are few practitioners who do not now employ, more or less extensively, apparatuses for the application of medicated vapours or gases to the skin ; but, I regret to say, that the principles, according to which they should be constructed, are too often entirely overlooked. Thus the temperature of such as are in common use cannot be elevated to the necessary height : it is impossible, by their means, to apply the vapour in a state of sufficient concentration ; because of its escaping into the apartment, and so affecting the respiratory organs of the patient, that the fumigation cannot be continued without great inconvenience : and lastly, they do not admit of the operation being sufficiently varied, either in respect to the kind of vapour used,

or the parts to which it is applied. It is scarcely necessary to observe, that the employment of instruments so imperfect must often be worse than useless. Indeed the want of success, thence necessarily arising, would be sufficient to bring the practice into total disrepute, if it did not stand on a basis which cannot be undermined. I have even known some practitioners of great respectability fall into very unaccountable mistakes. I have known them, for instance, confound the operation of heated air with that of aqueous vapour, although their action on the system is totally different. I have also heard of others, who, in place of using atmospheric air, which had been heated without any diminution of its purity, employ air warmed by a lamp introduced into the apparatus : apparently forgetful, that the combustion of the lamp necessarily deteriorates the air, and renders it totally unfit for the purposes required. Time will, of course, correct these errors. It is, however, necessary, in the mean while, to point them out, and to contribute, as much as possible, to their exposure and removal. That any assistance, in my power to afford, may not

be wanting, I shall always have much pleasure in permitting any practitioner, who may be desirous to establish apparatuses of proper construction, whether for private purposes or in public institutions, to inspect those which I have erected after considerable experience and attention to the subject.

When the last sheet of this essay was in press, a publication from the pen of that great benefactor of mankind, DR. JENNER, arrived in Dublin.* From its perusal I have received the most sincere gratification, not merely because it fully confirms the opinions advanced in the following pages, respecting the importance of *permanent* cutaneous irritation in the treatment of internal disease, but, because it affords a new proof of the great benefit which may be derived from the application of remedies to the skin; and clearly shews how imperiously practitioners are called on to combine their efforts, and reduce this interest-

* “ On the Influence of Artificial Eruptions in certain Diseases incidental to the Human Body.—London, 1822.” 4to.

ing branch of therapeutics to that state of certainty, which its great importance demands. As there cannot be a stronger proof of this truth than the cases of hepatic disease, which are related in DR. JENNER'S publication, and as these cases are very much to my present purpose, I am sure the reader will not require any apology for the liberty which I take of here transcribing them. The two first occurred in DR. JENNER'S practice, and the third was communicated to him by his relative the REV. G. C. JENNER.

“ ZEB SELMAN, ætat. 12.—He had been ill for six months with the symptoms of that disease which is termed chronic hepatitis. His liver felt generally enlarged, very much indurated, and sensible to the touch. He was seen at an advanced period of the complaint by a physician of acknowledged high abilities. This gentleman is reported by the patient's friends to have said, that if he had seen him at the commencement of the disease, the chances would have been *seven to one* against him, and now would be *ten to one*. The cachectic appearance and general emaciation were certainly such as indicated the probability of a fatal termination, and, if I had given an opinion, it would perhaps have been similar. At this period of the progress of the complaint the ointment* was applied with the usual cutaneous effect; after

* It may be necessary to mention that the ointment used by Dr. JENNER to produce cutaneous irritation and suppuration was that of the tartrate of antimony.

which he recovered with astonishing rapidity, and no vestige of the induration or enlargement within the abdomen remains. Mild aperients, which he had been in the habit of taking, were used during his indisposition.”—*p.* 10.

“ JOHN GAY, 39 years of age,—Was taken ill about four months ago, with feelings of languor and nervous debility, accompanied with dyspepsia, bilious and acid eructations: he had also pain in the right hypochondrium, dry sore throat, and general feverishness. With these symptoms he had pyrosis. His complaint continued to grow worse, especially a dull pain which had been going forwards in the region of the liver, till he was seized with symptoms of complete obstruction of the common duct of the gall-bladder. His skin became tinted with a deep blackish yellow colour. The food and medicines which he took, for some time after the symptoms of obstruction, regurgitated in an unaltered state, from the stomach. He found great difficulty in procuring medicines, from different medical men, that would act on his bowels. In this emergency, scanty evacuations of slime were procured by the administration of clysters; but he passed no solid stercoraceous stools; pills of soap and rhubarb, combined with an aromatic, and also the ointment, were now prescribed for him. Pimples appeared within twenty-four hours. These suppurated, and discharged pus with unusual freedom, and disposition to continue to discharge. About the time at which the pustules appeared, a sudden burst of evacuations took place, consisting first of bilious coloured fluid, next of slime of a green hue, and an abundance of shreds of a skinny appearance. In his first stools, at this time, my patient observed a mass, which he conceived to be food and medicines which he had taken previously, and had remained unaltered in the alimentary canal. The pain in his right shoulder and right hypochondrium abated rapidly, and his stools came away more solid, but still enveloped in slime. He is now convalescent, but tender under

the margins of the right ribs, and possessing a mitigated degree of unhealthy action about the liver. As his health *improved*, the eruptions evinced a *disposition to dry up*, but they have been continued. He had, four years ago, a constitutional sore, which has occasionally healed and re-appeared : its final suppression may have had some connexion with his present complaint. His recovery went on and was perfected in far less time than I could reasonably expect, considering the extreme state of debility to which he was brought by his long and severe sufferings. Within six weeks he resumed his laborious occupation, which was that of a sawyer.”—*pp.* 23-4.

“ WILLIAM HOLLOWAY, *ætat.* 26,—Very tall, and of rather a spare habit, about the end of December, or beginning of January last, was attacked with violent pain in the left side, and considerable swelling about the region of the liver, with most of the usual symptoms that attend hepatitis, together with others indicative of pulmonary affection. He was bled, blistered, and took various medicines, under the direction of several medical gentlemen in the neighbourhood. These remedies afforded him a temporary relief ; but he soon grew worse, and his malady continued to increase for six weeks, when I mentioned his case to you. By your advice, I furnished him with some of the ointment of tartarized antimony, and directed him to rub it on the chest. In twenty-four hours, eruptions appeared. The enlargement about the liver soon began to subside, the pain abated, and at the expiration of a month he was able to follow his usual occupation of a mason and bricklayer.

“ In September last, during the unsettled weather, he went to assist a neighbour in securing his corn ; when, after using great bodily exertion, and drinking freely of cider while he was very warm, he felt himself much indisposed, and in two days afterwards was seized with chills. The pain in the side

returned, attended with pain on the top of the shoulder and in the chest, shortness of breath, cough, quick pulse (I never found it under 120), and great debility. He now used the ointment, unassisted by any internal remedy. He received it from me with the most enthusiastic rapture, and used it more profusely than I intended, not only on the chest, but on the shoulder, and wherever he felt pain. A large crop of pustules was the result, which matured, and continued to discharge plentifully for nine days, when he was able to resume his work, and is now free from all complaint."—*pp.* 62-3.

Although the foregoing cases may appear almost incredible, it is, of course, entirely unnecessary to observe on the unlimited confidence which we are bound to repose in every statement made by their illustrious relator. If, therefore, a remedy be capable of producing such remarkable effects on the liver, simply in consequence of its power of exciting cutaneous irritation, how much greater benefit may we not rationally expect from chlorine, an agent which, at the same time that it excites an analogous irritation in the skin, influences in a most particular manner, the functions of the biliary organ!

Dublin,
3, Gardiner Place.

ANALYTICAL TABLE OF CONTENTS.

Part I.

CONSISTING PRINCIPALLY OF OBSERVATIONS RELATIVE TO THE APPLICATION OF MEDICAL AGENTS TO THE MUCOUS AND CUTANEOUS SURFACES. *pp.* 1-22.

NATURE of the cases in which nitro-muriatic acid has been principally used.—Result of general experience respecting its efficacy.—Result of the author's experience, and circumstances which led him to investigate the subject of the present essay.—Consequences of the investigation.—Object of this essay.—*pp.* 1-4.

Constant interchange of particles, a character of all living bodies.—Consequences of this faculty.—Manner in which all medicines act on the system.—Parts to which medicines are applied.—Analogy between skin and mucous membrane.—Their fitness to serve as a medium for the application of medical agents.—Objections to the application of medicines to the mucous surfaces—to the cutaneous surface.—Advantage of applying them to former—to latter.—The want of principles to regulate the conduct of practitioners, respecting the parts to which medicines should be applied much to be regretted.—Objects with which medicines are generally applied to the skin.—Skin not sufficiently used as an organ of absorption.—Instances of the powers which the skin possesses of absorbing medicine.—History of the mode of treating disease by medicated frictions.—Instances of the efficacy of medicine over disease, when introduced by friction.—Remarkable power of medicine over disease, when applied to the skin in a gaseous form.—Principles which explain this.—How much it is to be regretted that this mode of treating disease is so slow in being generally adopted in these countries—reason of this.—*pp.* 4-20.

Circumstances which led the author to use gaseous chlorine—the supposition that chlorine was the active medical agent in the nitro-muriatic acid—the knowledge of the greater efficacy of certain medicines, when applied to the skin at an elevated temperature and in a gaseous state.—pp. 20-22.

Part II.

BEING CHIEFLY AN ACCOUNT OF CASES (WITH OBSERVATIONS) SUBMITTED TO THE INFLUENCE OF CHLORINE. *pp.* 22-98.

FREQUENCY of diseases of the liver.—Obscurity of our knowledge respecting them, and imperfection of our mode of treating them—consequently the value of the present remedy.—Arrangement of cases treated by chlorine.—pp. 22-4.

Case A., Jaundice—observations ; p. 25.—Case B., Enlargement of the liver with tendency to dropsy—observations ; p. 32.—Case C., Biliary calculi or gall stones—observations ; p. 39.—Case D., Chronic inflammation of the liver—observations ; p. 45.

Latent disease of the liver may cause sensible disease in remote parts.—Erroneous views respecting the seat of pain, indicative of disease of the liver.—Frequency of sympathetic affections, which result from hepatic disease.—Remarkable influence of the liver on the heart, and of the heart on the liver—cause of this.—pp. 49-57.—Case E., Disease of the heart in consequence of latent disease of the liver—observations ; p. 57.—Remarks on the frequent connexion of dropsy and disease of the liver.—Dropsy almost constantly symptomatic.—pp. 62-6.—Case F., Dropsy from disease of the liver—observations ; p. 66.—Remarks on the power which disease of the liver has of producing disease of the skin ; pp. 71-4.—Case G., Cutaneous disease from disease of the liver—observations ; p. 74.

Observations on the power which external injury of remote parts has to produce internal disease in general, and of the liver in particular.—Observations on those diseases of the liver which succeed to injuries of the head ; pp. 78-89.—Case H., Disease of the liver consequent to injury of the head—observations ; p. 89.—Power which disease of the liver and other internal parts have of causing rheumatism.—Internal disorder often results from the retrocession of rheumatism—on these occasions liver frequently suffers.—pp. 94-5.—Case I., Disease of the liver in consequence of rheumatism—observations ; pp. 95-98.

Part III.

ON THE GENERAL MEDICAL AGENCY OF CHLORINE; ON THE MODE OF EMPLOYING IT; &c. &c. *pp.* 98-148.

INFLUENCE of chlorine on the body, in a state of health—on the skin—on the mucous surfaces and their secretions—on the heart and lungs—on the brain and nerves; *p.* 98.—Means by which chlorine acts on the system; *pp.* 68-112.

Extensive medical agency of chlorine—promises to be beneficial in LUES, SCROFULA, RHEUMATISM, CATARRH, &c.—Cause of its beneficial influence in HEPATIC DISEASES.—AFFECTIONS of the LIVER, in which it is more particularly beneficial.—Power of benefiting other diseases, in consequence of its influence on the liver. Utility in certain nervous states—in HYPOCONDRIASIS.—Utility in diseases which appear to depend on irregular determinations of blood, as HEADACHES, FLUSHINGS, COLDNESS OF LIMBS, TORPIDITY OF BOWELS, DEFFICIENT OR SUPPRESSED MENSTRUATION, HYSTERIA, CHLORORIS, CHOREA, EPILEPSIA.—Manner in which it acts in these diseases.—Utility in certain disorders of the STOMACH and BOWELS—reasons of this.—Remarks on its use in organic disease of the liver, and in acute inflammation of this organ.—*pp.* 111-127.

Mode of applying chlorine.—Mode of obtaining this gas.—Quantity required.—Variety in this respect.—Absolute necessity of having a perfect apparatus.—Temperature at which it should be used.—Length of time of remaining in the apparatus.—Remarks on the medical treatment.—*pp.* 127-138.

Resemblance between the action of chlorine and nitro-muriatic acid.—Composition of latter.—Cases in which the nitro-muriatic acid may be used, in place of chlorine fumigations.—Mode of using the nitro-muriatic acid.—Remarks on chlorine as a substitute for mercury.—Similarity of their actions on the system.—Will be found useful when mercury has failed.—Conclusion,—*p.* 138-148.

RESEARCHES,

&c. &c.

THERE are few practitioners who have not had occasion to use applications of “Nitro-muriatic acid” to the skin, in certain diseases of the liver, and in certain cases of syphilis, for which mercury had been administered without success ; or in which the patient was, from an impaired constitution, or from some peculiar idiosyncrasy, unable to undergo its action.

I believe it may be affirmed, that the general result of experience respecting this remedy is, that, although its administration has, on some occasions, been followed by very considerable and very beneficial effects, on the constitution and on the disease, at other times no sensible action has resulted ; and, unless I am mistaken, many have had occasion to regret the loss of time spent in its fruitless employment.

Such, at least, was the result of my own experience ; for, although I had sometimes produced by it the most decidedly good effects, and certainly in very discouraging cases, yet, in others of an analogous kind, and often not so severe, I was entirely unsuccessful. In short, having been so often disappointed in being able to obtain any certain or determinate effects from its administration, I had ceased to use it, except in cases, for the relief of which there was no other resource left.

While my opinion was in this state, a very hopeless case of chronic liver disease occurred ; and, having tried many remedies in vain for its removal, I ordered the employment of the “ Nitro-muriatic acid ” embrocations, although I did not expect much advantage from them. The most fortunate result, however, ensued—my patient perfectly recovered. About the very same period, I happened to meet an old friend, who had lately returned from India, where he had suffered much from hepatic disorder. I asked this gentleman his opinion of the powers of the “ Nitro-muriatic acid.” He instantly replied, “ *I have no doubt of its great powers—it saved my life.*” Was it possible, after such occurrences, to avoid lamenting the very uncertain action of this remedy ? an action so uncertain, that, while it produced in some cases effects almost incredible, in others it ap-

peared so inert, as not to influence, in any way, the constitution of the person to whom it was applied. I indeed resolved, from that moment, to devote considerable attention to the subject, in hopes of acquiring such information as would enable me to employ it with the certainty of its always producing at least some *determinate* effect on the economy. Being, at the same time, particularly engaged in inquiries relative to the mode of treating disease by applications to the skin, and consequently finding myself in a situation well calculated to enable me to prosecute the subject with facility and effect, I entered the more readily on the investigation.

The researches made, in consequence of this determination, have fortunately led me to the employment of a very valuable remedy, (*gaseous chlorine*,) and to a mode of applying it to the skin, by which we can secure its influence on the system. To communicate to the profession these results, together with an account of cases submitted to the action of this agent, which I may be here permitted to observe, I have found a most important addition to our means of treating some of the most intractable diseases incidental to the human body, is the intention of the present essay: but, before I enter on its more immediate object, it may be well to make some remarks on the general efficacy of medicines applied to the skin; and on the advan-

tages likely to be derived from such a practice in the treatment of disease. This, perhaps, is the more necessary, as there may be some who are not acquainted with the extensive powers we possess of influencing the system through the medium of this organ.

“UT ENIM DATUR ALIARUM PARTIUM IN CUTEM ACTIO, ITA CUTIS PARITER ACTIO IN ALIAS PARTES EXISTIT.”—LORRY, *De morbis Cutan. Introd.*

THE most remarkable character of living bodies is derived from the constant interchange of particles, which exists between their component parts and the surrounding world; and from the sympathy which binds together the various organs, that by this very connexion, constitute the individual. It is from these properties that all such bodies are subject to decay and death, and it is also from the very same qualities, that they are capable of being influenced by those agents, which medicine affords for the preservation of health and the prolongation of life. In truth, all our remedies, which do not produce their effect by a direct local influence,* must act either through the medium of those sympathies, which connect the numerous organs of our body, or else by being

* By direct local influence is meant the action of medicine on parts, to which they are *primarily* applied.

conveyed along with the circulating fluids to those parts, on which they are destined more particularly to produce their effect.

It is well known that all medicines, whether it be intended that they should produce a direct influence, or operate by exciting sympathetic actions, or enter the mass of circulating fluids, must be applied, or, more correctly speaking, are applied, to some of those surfaces, which are naturally in contact with bodies that do not form any part of the individual. Of these surfaces, one is external, and called cutaneous; and the other internal, and called mucous. The analogies that exist between these two surfaces, whether we consider their structure, their properties, their sympathies, or even their general functions, have been so clearly ascertained and pointed out by modern physiologists, that they might be considered as different portions of the same membrane.*

* As instances of these analogies, it may be observed. 1st, They are both endowed with that kind of sensibility, which enables them to bear with impunity the impressions of foreign bodies. 2dly, They are both protected from the influence of these bodies by an inorganic covering thus, an epidermis covers the cutis, and the chorion of the mucous membranes is covered by an epidermis, by a mucous fluid, or by both. 3dly, They are the seat of all the excretions. 4thly, It is by these surfaces that all substances are introduced into the body from without. 5thly, The capillary portion of their vascular system has the same arrangement. In the foregoing characters they resemble each other, and, by the same characters, they are distinguished from the rest of the organs or tissues of

To enable any organ or texture to serve as a medium for the administration of medical agents, it is necessary that it should possess extensive sympathies, and be supplied with numerous absorbents, which would convey into the general circulation such bodies as may be applied to them. This is precisely what we observe to be the case in respect to the qualities of the cutaneous and mucous surfaces : they have both most extensive sympathies, and they are both every where studded with the mouths of absorbent vessels.*

the body ; but, perhaps, the most striking proof of their resemblance is to be derived from the circumstance of one being convertible into the other. It is said that some animals of very simple organization can, like the finger of a glove, be turned inside out, and will continue to live ; their cutaneous surface becoming mucous, and the mucous assuming the character of the cutaneous. The same transmutation even occurs, to a certain extent, in the human body, when a mucous surface is brought into that situation, which is natural to the cutaneous, or *vice versa*. Thus the mucous membrane of a prolapsed vagina will take on the character of skin ; and skin often assumes the nature of a mucous surface, when it is exposed to moisture for a considerable time, as sometimes happens at the folds of the nates, &c. As a further proof of their resemblance, it may be also observed, that the cutaneous surface of the globular hydatid performs the function of both skin and mucous membrane ; for, as this animal is not provided with a mouth, all its nutriment must enter by means of the absorbents, which open on its external surface. See “ Lectures on Comparative Anatomy, by SIR EVERARD HOME, Bart. Lond. 1814.”—“ Anatomie Generale, par XAVIER BICHAT.”—“ Lecons d'Anatomie comparée de G. CUVIER.”—“ Philosophie Zoologique, par. J. P. B. A. LAMARK. Paris, 1809.”

* See “ Vasorum Lymphaticorum Corporis Humani Historia et Ichno-graphia. Auctore PAULO MASGAGNI, Senis, 1787. Fol.”

As there is such a resemblance between the cutaneous and mucous membranes, it might be supposed, from what has been said, that it would be a matter of indifference to which of them our medicines were applied. This, however, is very far from being the case.

When we consider the great importance and delicacy of those organs, on which the mucous surfaces are expanded, and the disorder, both temporary and permanent, frequently produced in their functions by the application of remedies; when we reflect, that they are concealed from our view, and consequently that we cannot observe the operation of those medicines, which have been applied to them; and lastly, when we consider, that the greater portion of these surfaces are protected at their origin by a sort of sentinel, which conveys to the mind the ungrateful impressions necessarily produced by the majority of medicines;—we shall not hesitate to admit, that the application of such agents to these surfaces is not void of risk; their mode of operation often concealed, or obscure and unsatisfactory; and their administration, even when possible, which is not always the case, attended by sensations more or less disagreeable to the feelings of the patient.

Under these circumstances it might, therefore,

be asked, why are our remedies ever applied to the internal or mucous surfaces?—why are they not always administered by the cutaneous? To such questions, it must be answered, that, certainly, on some occasions, medicines will act more efficaciously when internally applied; and it must also be admitted, that, as far as our experience goes, there are many valuable remedies, which, although they act very efficaciously when applied to a mucous surface, will scarcely produce any effect, when applied to a cutaneous. It must, nevertheless, be here observed, that I am convinced, from considerable attention to the subject, that there are many medicines now applied to the mucous surfaces alone, whose action would often be far more safe and more efficacious if applied to the cutaneous; and I shall have occasion hereafter to shew, that there are many valuable agents, which may be applied with safety and with great advantage to the latter, although we dare not apply them to the former. At the same time, I shall also admit, that, on some occasions, remedies are applied to the skin, which would act more promptly and more efficaciously if their application was made to a mucous surface.* It would really be a matter of extreme importance to ascertain, with accuracy, the principles which should regulate our

* BICHAT.—“ Anatomie Generale, Tome 2, p. 448.”

conduct on all occasions as to the part of the body, to which we ought to apply our remedies; and there is no one anxious for the true interests of medical science, who must not exceedingly regret the imperfection of our knowledge on this subject.

If we consider the principles which influence our conduct in the application of medicines to the cutaneous surface, it will be observed, that it is very seldom we have any other object in view, than that of affecting the more deeply seated organs by means of the sympathy, which exists between them and the skin. Thus, we are in the habit of exciting artificial inflammation and suppuration by caustics and blisters, of causing a partial or general determination of blood by irritants and rubifacients, of reducing temperature by cold affusion, of tranquillizing sensibility by tepid ablution or immersion, &c. &c. Every one engaged in the practice of medicine is well aware of the important advantages derived from the foregoing means of treating disease. Why then have we not attempted to extend the boundaries of therapeutics by using the skin as the medium of affecting our circulating fluids, and, through them, the more remote parts of the system? This, certainly, has not been owing to a conviction, that the attempt was hopeless; or to our wanting well ascertained proofs of the power of this mode of influencing the constitution, for such have

existed since before the days of Hippocrates.* I do not, however, mean, by what I have here said, to insinuate, that we have been entirely inattentive to this description of inquiry. On the continent, in particular, much has been done; although it may be deemed but trifling, when compared with the extent and importance of the subject. Many valuable facts respecting the introduction of medicine into the circulation, by means of cutaneous absorption, have indeed been ascertained, of which it may perhaps be interesting to mention a few.

* It has been stated by *CHRESTIEN*, that the ancients did not use medicated frictions, or, more properly speaking, that they did not employ frictions with a therapeutic object in view. This is, I believe, an erroneous assertion. *PRODICUS*, who flourished about 396 years A. C. and *HERODICUS*, who lived a little earlier, about 443, A. C. were, perhaps, the first who had recourse to this mode of treating diseases. (*M. DUVAL*.) *HIPPOCRATES* often employed medicated frictions for the relief of female complaints; particularly to excite too languid menstruation. *DIOCLES* was, in these ancient times, well acquainted with the sympathy that exists between the mucous and cutaneous surfaces, and used a mixture of ox bile and hellebore to produce vomiting. *THEOPHRASTUS* has remarked, that aromatic frictions caused eructations of an odour analagous to those of the aromatics which he employed. It was about this period, that opium was first administered by friction. *DIAGORAS* often employed it in this way. *CELSUS* has treated dropsies by frictions with squills on the abdomen; and the diuretic influence of these frictions was as well known to him as their power of producing local irritation. *ASCLEPIADES* often employed medicated frictions. *ARETEUS* used aloetic frictions on the epigastrium for the cure of gastric diseases. *GALEN* knew that medicines, finely pulverized and applied to the skin, can be conveyed into the circulating fluids, and act on the internal organs. He made experiments with pepper, pelitory, cantharides, &c. His successors frequently treated diseases by frictions. They knew the

Frictions with rhubarb, mixed with lard or saliva, produce abundant evacuations.—**CHIARENTI**.

Rhubarb and jalap, mixed with saliva, and the whole incorporated with lard, caused copious purgation.—**ALIBERT**.

Squill mixed with saliva, and administered by friction, has a very powerful diuretic effect.—**CHIARENTI**.

power which cantharides, mercury, and certain poisons, &c. have, when applied to the surface, of affecting the internal organs.

Among the moderns, **BOYLE** must be mentioned as one well acquainted with the influence which medicines exert on the system, through the medium of the skin. During his inquiries respecting the porosity of bodies, he observed, that, by holding cantharides in his hand, the urinary organs were influenced. He was not ignorant of the intoxicating effects of nicotiana applied to the surface; and it is even asserted, that he knew that frictions with purgatives acted on the bowels. In the beginning of the 18th century, in Italy, the mode of treating disease by applications to the surface came greatly into practice; but soon again sunk into disrepute, in consequence of the exaggerated statements of **PRIVATTI**, **VERATTI**, **PALMA**, **BRIGOLI**, &c. who, asserting the possibility of introducing medicine into the body by the agency of electricity, promulgated that they could produce alvine evacuations by causing the patient to hold in his hand, while on an insulated stool, tubes of glass, daubed on their inner surface with purgative medicine.

In the latter end of the 18th century, the researches of the **HUNTERS**, **MASGAGNI**, **CRUIKSHANK**, and **HEWSON**, respecting the absorbent system, appear to have excited new attention to cutaneous absorption; and hence followed the inquiries, on this subject, by **SPALLANZANI**, **CHIARENTI**, **BRERA**, **BALLERINI**, **SALMON**, **ROTTU**, **TOURDES**, **ALIBERT**, **PINEL**, **CHRISTIEN**, **BARTHEZ**, **DUVAL**, &c. &c., to whom we are principally indebted for our present knowledge on the subject. See “*Dic. des Sciences Médicales.*”

Powdered digitalis, mixed with saliva, and applied by friction to the inside of the thighs, arms, and legs, augments the urinary secretion: united to squill and the acetate of potash, it irritates the intestines, and causes dejections preceded by gripes.—ROGERY.

Camphire, applied by friction to the inside of the thighs, affects the urinary and genital organs.—CHRESTIEN.

Frictions on the abdomen, back, and inside of the thighs, with the tincture of bark, or with the extract of cinchona dissolved in saliva, produce on the system the specific action of this remedy. The same effect is also produced by wearing a flannel vest having powdered bark placed between its duplicatures.—BARTHEZ, CHRESTIEN, KENNEDY, ALIBERT.

Frictions on the epigastrium with decoctions of tobacco cause vomiting. It is also said, that the same effect may be produced by frictions with tartrate of antimony.—SHERWIN. The latter assertion is denied, and, I believe with reason, by HUTCHINSON and others.

Frictions with opium, mixed with oil of almonds and spermaceti, produce a narcotic effect.—RICHARD.

Frictions with opium, mixed with gastric juice or saliva, have the same effect.—CHIA-RENTI.

A camphorated tincture of opium, applied by friction, produce the specific action of these medicines.—BRERA.

Frictions on the head with a decoction of tobacco have a remarkable narcotic influence.

We are now well acquainted with the influence, which frictions with belladonna on the forehead, &c. have upon the eye.

It is unnecessary to allude to the well-known action of mercurial frictions on the salivary glands, liver, &c. &c.

Frictions with iodine produce the same effect on the system as are produced by its internal administration.—COINDET.*

Cantharides introduced by the skin influence the urinary and genital organs.

* “ I continue always to prescribe iodine internally, but less frequently than I formerly did ; *because the frictions give the same result, without running the hazard of injuring the stomach.*”—See a letter in the Quarterly Journal of Science, Vol. xii. 1822, p. 245, from DR. COINDET.

It is well known, that many poisons affect internal organs, when applied to the skin.

But it is not merely the power of *acting on the system* by medicated frictions, that has been satisfactorily ascertained—the beneficial influence of these frictions, *in the treatment of disease*, is also established. They have been used with the greatest success in many cases, viz.

In intermittents and other forms of fever, by CHRESTIEN, ALIBERT, &c.

In various chronic inflammations of mucous membranes, by FAGES, CHRESTIEN, &c.

In dropsy, by BRERA, BALLERINI, ROGERY, ARCHBOLD-ASPOL, DUMERIL, CHIARENTI.

Their utility in various inflammations of the fibrous structures, as rheumatism, &c., is daily observed: they have been used with particular success, in these cases, by THEBAL.

In various diseases of menstruation, medicated frictions on the abdomen and loins have been found extremely beneficial by THEBAL, CHRESTIEN, &c.

In many affections called nervous, as epilepsy,

chorea, ischuria, incontinence, cardialgia, ischiatica, their efficacy is extolled by CHRESTIEN, THEBAL, ARCHBOLD-ASPOL, BLAVAL, THOMAS.

We have been lately made acquainted with the influence of frictions with iodine in scrophula, by COINDET.*

Certain preparations of gold, particularly a muriate of gold, have been represented as capable of producing, when applied by friction, most salutary effects in syphilis, and several other organic diseases.—CHRESTIEN, DUPORTAL, PELLETIER, LALOUETTE.

The influence of mercurial frictions in syphilis and many other diseases is universally known.†

* I am at present submitting a number of scrophulous patients, at the Skin Infirmary, to the influence of this new remedy; and shall probably, before long, lay a report of their cases before the profession.

† For an account of the experiments, by which the foregoing facts have been ascertained, see “*Observations sur l’efficacité des remèdes administrés par la voie de l’absorption cutanée dans le traitement de plusieurs maladies internes et externes par J. A. CHRESTIEN, Paris, 1811.*”—“*Brera (Valeriano-luigi) Anatripsologia, ossia dottrina delle frizioni, che comprende il nuovo metodo di agire sul corpo umano, per mezzo di frizioni fatte cogli humani anamali, e colle varie sostanze che all’ordinario si somministrano internamente; edizione quarta. Pavia, 1799.*”—“*Observations et expériences sur quelques médicamens purgatifs, diuretiques, et fébrifuges, appliqués à l’extérieur. Par J. L. ALIBERT,*” in “*Memoires de la Société Médicale d’Emulation. Paris, 1802, p. 246.*”

Although it may be argued, that some of the foregoing effects are the consequence of the *immediate*, or of the *sympathetic* influence of the frictions employed, still it must be admitted, that many depend on the *absorption* of the material which has been used in the friction.

If then such be the results, which may be obtained from the application of medicine to the surface of the body, under circumstances, when neither its sensibility to impressions nor its powers of absorption are greatly excited by artificial means, and when the materials are not reduced to a state of extreme division, have we not every reason, *a priori*, to expect much more remarkable consequences from the application of the same agents in the gaseous form, and while the skin is in that state of excitement, which necessarily arises from its exposure to a high temperature.* For, under this exposure, all the vital actions and properties of the organ, both organic and animal, and consequently its sensibility and powers of absorption, are, as far as we can judge, increased. Moreover, it can scarcely be doubted, that medicines, when they are reduced to the state of extreme division, in which state they are, when in the form

* The advantage of the heat of a fire during the application of mercury, and of many other remedies by friction to the surface, is generally known. This perhaps can only act by exciting absorption.

of gas, will act more efficaciously than when in a grosser state ; and this whether their action result from their direct influence on the skin,* or by gaining admission into the mouths of the cutaneous absorbents.† In short, those effects, which hypothesis would lead us to expect from the influence of medicated vapours or gases, applied to the skin, are realized in practice, and perhaps

* “ Il est reconnu que ces vapeurs, qui sont pour ainsi dire un être moyen entre l'air et l'eau, sont bien plus pénétrantes et plus actives que ce fluide, lorsqu'il est soumis aux lois de la cohésion ; une grande partie se condense sans doute sur le corps plus frais qu'elles ; mais il n'en est pas de même de toutes ; au moins l'expérience nous apprend que les vapeurs de vinaigre agissent bien plus fortement sur le plomb que le vinaigre sous sa forme fluide.” “ De la Nature et de l'Usage des Bains, par HENRI—MATHIAS MARCARD. Traduit de l'Allemand, par MICHEL PARANT. Paris, 1801,” p. 218---19.

† This last opinion is supported by the experience of Mr. Abernethy. He observes, “ I shall here insert a case, which was related in the first edition of my Surgical and Physiological Essays, to shew the efficacy of *mercurial fumigations in affecting the constitution, when other modes of administering mercury had failed to produce its specific effect.*” And in a note, he adds, “ It is not my intention to re-publish the cases in proof of this fact, because I think that the present one is sufficient to evince its truth. It seems, however, right to mention, that my opinions on this subject are unaltered ; and to repeat, that *I have found mercurial fumigations* employed in the manner recommended by the Chevalier Lalouette, a physician in Paris in 1776, to be, in the majority of instances, a more powerful and innocent means of producing a mercurial affection of the constitution than inunction, or the internal use of mercury ; and equally certain of radically curing the disease, for which it has been thus administered.” See “ The Surgical Works of JOHN ABERNETHY, F.R.S., &c. &c. London, 1811. Vol. 1.” p. 15, 16. “ ON DISEASES RESEMBLING SYPHILIS.”

the greatest modern improvement in therapeutics consists, not certainly in the *invention*, but in the perfection and extention of the mode of applying such agents to the surface of the body, for the purpose of influencing the actions of our system.

After what has been already said, it is scarcely necessary to observe, that the improvements, which have taken place in this branch of medicine, have led, not merely to a better mode of administering such remedies as we wish to introduce, by means of the cutaneous absorbents, but have also greatly increased our power of influencing the properties and functions of the skin itself: and this must be admitted to be of the first importance, whether our object is to restore this important organ to a healthy state; to cause a diversion of diseased action, from the internal viscera, by producing cutaneous irritation; or, by means of sympathy, to excite healthy actions in other parts.

When we consider the rational prospects, which are held out from a more extended employment of the mode of treating disease by applications to the skin; and when we reflect on the rapidity, with which the practice is extending itself on the continent, (where its utility

is best known,) it is impossible to avoid feeling the deepest regret, that we should, in these islands, have remained so long without putting it to the test of *general* experiment. It is indeed to be feared, that there is too much truth in a remark which I have made in another publication, “that the progress of the arts and sciences is often retarded by the indifference or unwillingness, with which new discoveries are frequently received; more particularly, when they are much in opposition to accustomed modes of thinking and acting, and when trouble and exertion are required for their application.”* Surely I may be permitted to say, that, until this branch of therapeutics be properly investigated, it would be the height of presumption to deny the apparently well authenticated instances of its extreme efficacy.† It gives me sincere gratification to have it in my

* See “Observations on a New and Powerful Mode of Treating Rheumatism and Cutaneous Disease, by WILLIAM WALLACE, 1820, Dublin.”

† See “Ricerche Mediche su i Bagni a Vapore e di Calorico, e sulle fumigazioni di sostange Ammoniacali e Balsamiche, di Zolfo, di Mercurio, &c. del Chevalier PAOLO ASSALINI, M. D., Tom. I. 4to. NAPOLI, 1820.”—“Essai sur l’Atmidiatrique ou Médecine par les Vapeurs, par T. RAPOU, de LYON, D.M.P.—A Paris, et A Lyon, 1819.”—“Memoire et Rapports sur les Fumigations Sulfureuses, Appliquées au Traitement des Affections Cutanées, et de Plusieurs Autres Maladies, par J. C. GALES, imprimés par Ordre du Gouvernement, PARIS, 1816.”—“Essai sur la Gale, brochure in 4to. avec figures, à Paris, par J. C. GALES.”—“Description des Appareils à Fumigations, établis, sur les Dessins de M. D’ARCET, à l’Hospital SAINT LOUIS, en 1814, et successivement dans plusieurs Hôpitaux de

power to communicate, that I have already, on innumerable occasions, witnessed the advantage of this mode of practice ; and I can assert, with confidence, that it has enabled me to alleviate and remove maladies, over which I had no control by the influence of remedies previously in use.

Let me here observe, that, although I have made the preceding *general* observations, I trust I shall not be deemed either forgetful or ignorant of many facts, that have been ascertained among us, connected with this important subject. But, while I admit that desultory attention has, from time to time, been given to such inquiries, I must say, they have not at all obtained that examination and serious attention, which their great importance demands. This, I think, will be sufficiently proved by the facts, which I shall now proceed to communicate.

“ *MEDICINA NON INGENII HUMANI, SED TEMPORIS FILIA.*”—BAGLIVI.

IT is well known that the effects, which arise in consequence of mercurial frictions, vary much

Paris, pour le Traitement des Maladies de la Peau, à Paris, 1818.”—

“ Observations Pratiques sur les Fumigations Sulphureuses, par JEAN DE CARRO, Vienne, 1819.”—“ Dictionnaire des Sciences Medicales,” Articles “ Gale,” “ Fumigation.”

in different individuals; and that these varieties are partly owing to the skin being in some a less perfect organ of absorption than in others, there does not appear to be any doubt. Is it not likely that the various effects, which result from the employment of the "Nitro-muriatic acid," may depend on the same cause? This consideration occurred to me almost as soon as I began to reflect on my new subject of inquiry; and I thence naturally concluded, that, if such was the case, I could not hope to arrive at the means of administering this remedy so as to produce, at all times, its specific influence on the system, (which was the object I had in view,) except by employing it in a form more advantageous for cutaneous absorption than that, in which it is generally used, or by improving the absorbent powers of the skin.

I had long since, from various causes, formed an opinion, that the active medical agent in the "Nitro-muriatic acid" was, in all probability, chlorine.* I had also, from experience, learned that remedies applied to the surface of the body, in the form of gas or vapour, were more active than when used in any other form; particularly if the body was, at the same time, excited by

* This is also the opinion of Dr. Scott, see "Med. Chir. Transac. London, 1817, Vol. 8, Part 1." p. 197—8.

exposure to a high temperature. It was thus, that I was led to try the influence of chlorine gas, in hepatic diseases, assisted in its operation by an artificial heat.

QUANTO MAGIS AD SANITATEM PRODEST, TANTO ET DETERIUS IN MORBIS AFFICITUR.—ARETÆUS CAPADOX.

Morbid states of the liver are so very frequent, that, if I asserted that the number of diseases, which depend, more or less, on derangements of the biliary system, exceeded all others taken conjointly, I should not be much in error.* Was it, therefore, extraordinary, that the ancient physicians, who were well acquainted with the extensive sphere, which this organ exercises in disease, should have considered it as possessed of the important functions, which they attributed to it? †

* BOERHAAVE has said, that, out of one hundred chronic diseases, there was scarcely one, in which the liver was not affected. The liver is moreover subject to acute disease.—See *Institut. Med.*—The late Dr. Corry of Guy's Hospital, one of my respected preceptors, was, of all the physicians, whose practice I have ever had an opportunity of observing, the most disposed to attribute a very large proportion of the various diseases, to which we are subject, to the liver as their source; and I have often had occasion to observe the great success, which attended his practice, regulated by these principles.

† The ancients believed, that the liver was the organ of sanguification, the source of animal heat, the seat of the natural faculties, &c. &c. See

or is it to be wondered at, that a general system of treating disease, which must act very much by influencing the actions of the liver, should have remarkable efficacy?*

Although hepatic diseases are so very frequent, and consequently our opportunities of observing them proportionably numerous, it must be admitted, that we have not arrived at much correct knowledge respecting them.† This probably arises from many causes: the extent of the subject is at least one; but there are still other and probably more material ones. It is not however my intention, in this publication, to attempt an inquiry into any of the particular diseases of the biliary organ, or to investigate the causes, which have retarded our progress respecting them.‡ I simply allude to the

the works of GALEN and BAILLOW: see also FERNEL, *Pathol. de morb. Jecor. Fol.*—BIANCHI, *Histor. Hepat.*—RIOLAN, *de Hepate.* In the last work will be found a summary of the opinions of the ancients, respecting the uses and diseases of the liver.

* See ABERNETHY “*On the Constitutional Origin and Treatment of Local Diseases;*” and “*Observations on the Utility and Administration of Purgative Medicines,* by JAMES HAMILTON, M. D.”

† “Il n’y a point de maladies, comme nous l’avons dit plusieurs fois dans cet ouvrage, qu’on connaisse moins et qu’on traite avec si peu d’avantage que celles du foie.”—See “*Observations sur la Nature et le Traitement des Maladies du Foie,* par ANTOINE PORTAL. Paris, 1815.” p. 608.

‡ Perhaps the difficulties we have to encounter, in investigating the

frequency of these diseases, and to the obscurity of our knowledge, to prove the importance of a remedy, which is capable of affording considerable assistance in a vast proportion of them, as will appear from a perusal of the cases which I shall now proceed to lay before the reader, arranged in the three following classes. 1st, Those, in which the liver was the organ both primitively and principally affected. 2nd, Those, in which the principal distress was not referred to the liver; although there was every reason to suppose, as well from the history of the cases, as from their termination, that this organ was the original seat of disease. 3rd, Those, in which the liver was the principal seat of disease, but in which its disease had been preceded by a morbid state of other organs.

pathology of the liver, principally depend upon the obscurity of symptoms, and their sympathetic complications, which frequently conceal, from the attention of the patient and practitioner, the true seat of disease. To this we might add, that very different states or diseases of the liver often produce similar symptoms.

CASES IN WHICH THE LIVER WAS THE ORGAN
PRIMITIVELY AND PRINCIPALLY AFFECTED.

CASE A.

THE subject of the following case was a lad aged about nineteen, having such an appearance as would lead one to suppose, that, prior to the occurrence of the present disease, he had been in rude health. When I first saw him, which was in May, 1819, among the extern patients of the Jervis-street Infirmary, every part of the surface, usually tinged in jaundice, was remarkably yellow. He complained of great uneasiness in the epigastrium, (increased by pressure,) extending into the right and left hypochondria; of a dull oppressive pain in his forehead; of great languor and listlessness; of dislike for every kind of food, except very sour buttermilk. His bowels were remarkably torpid,—stools whitish, without the slightest tinge of bile, and, having a fetid, sour smell, very unlike the smell of healthy fœces,—tongue much loaded with a thick yellowish white mucus,—bitter taste in his mouth,—urine remarkably turbid and tinged his linen a deep yellow,—his perspiration, under the arms, sometimes produced the same effect,—pulse

not more than 66 in a minute,—no febrile heat of surface,—considerable itching in his skin,—smarting in passing water.

This boy had laboured under the above complaints, at least six weeks, before applying to me. He attributed them to his having taken a large draught of cold water, when very much heated,—had been at several hospitals, where he got purgatives, and other remedies, the nature of which I could not ascertain. Of the treatment adopted by me, I have preserved the following note:—

May 14th, 1819. To have, on the evening of this day, ten grains of the compound colocynth pill; and to-morrow morning, if necessary, four drachms of sulphate of magnesia, dissolved in eight ounces of tepid water.

15th. Two stools this morning, from the purgative medicine: they are scanty, whitish, sour, and liquid. Let the surface of his body, from the neck downwards, be exposed this day for half an hour to the influence of chlorine; and let the temperature of the apparatus be 110, Ft.*

* The mode of applying chlorine, both generally and topically, will be described hereafter.

16th. Had no motion since the operation of the purgative medicine, and does not feel any alteration in the state of his complaints. After he had been in the apparatus for a few minutes, being observed to be a little restless, I asked him whether he was uneasy? He answered in the negative; but said, that he felt as if all his skin was pricking by small needles. His pulse was a little accelerated, and he perspired considerably. The purgative pills and Epsom salts to be repeated as before, and let him remain in the apparatus forty minutes, exposed to the action of chlorine, temp. 110.

17th. The purgative medicine has operated copiously; and, although a considerable portion of the stool has an appearance such as already described, a part is evidently tinged with bile, and the patient observes, that he rested better last night than usual. Urine still very dark and muddy. The immediate effects of the chlorine had been as the day before. Let the chlorine be continued as yesterday.

18th. Had a considerable discharge from his bowels this morning, although he had not taken any medicine. It is the first discharge which he has had, without medicine, since his complaints began. The fœces, although very much tinged with bile, have still a sourish smell,—the urine

remains much darker than natural, yet neither so deep in colour, nor so muddy, as yesterday; his eyes are beginning to clear; the entire aspect of his countenance is much improved; and the tenderness in the epigastrium greatly diminished. The application of the chlorine to be continued, as before.

19th. Complains of soreness of his mouth. His surface is covered in various parts with minute bright red papulæ. No motion from his bowels since yesterday, nevertheless all the symptoms are alleviated,—ate his breakfast with a relish this morning, for the first time since the commencement of his complaints,—pulse 70,—skin less yellow,—itching subsided,—countenance exceedingly improved,—tenderness and uneasy feelings in the upper region of the abdomen greatly decreased,—no longer complains of ardor urinæ,—urine now copious, lighter coloured, and clearer,—tongue cleaning along the edge and tip. Chlorine to be repeated.

20th. Copious bilious purgation early this morning,—appearance of his countenance exceedingly improved since yesterday,—urine clear, but still deep in colour,—tongue cleaning very fast,—relishes his food,—thirst gone,—soreness of his gums increased,—eruption stationary. Chlorine to be continued as before.

22nd. His aspect so much altered, that he scarcely appears to be the same person,—almost all the symptoms of jaundice are entirely gone,—the soreness of his gums not increased; but he observes, to use his own words, that he cannot refrain from constantly spitting, and that there is a great flow of water into his mouth. He used the chlorine on the 20th and 21st. His bowels act without medicine. The purgative to be repeated, and the chlorine continued.

24th. Convalescent.—Will not remain longer in town. On the 23rd he took his usual seat in the apparatus. I have permitted him to go to the country, taking with him some of his purgative pills and salts; and requested him to let me know how he was at the end of a month, if no important change occurred sooner, in which case he promised to return.

At the end of five weeks he called on me, perfectly restored in every respect; and having every appearance of excellent health.

It may be easily conceived how much I was gratified by the results of the foregoing case. It was the first, which I submitted to the action of chlorine; and it fully satisfied me, as far as one case could, of the specific influence of this

agent on the liver, and of the advantages, which might be expected from its employment.

I think it must be allowed, that the removal of the disease could only be owing to the chlorine. I studiously made the treatment (and it may be here observed, that I adopted the same plan in all those cases, which I have hereafter to relate, as simple as I possibly could,) that I might the better judge of the influence of the remedy; whose powers I was investigating. There was, in this instance, nothing used but purgatives; and it could not be supposed, for a moment, that the cure was owing to their effect on the disease; for they had been previously employed, to a much greater extent than by me, but without any good effect.

Although I cannot speak positively, yet I think there are but few, who will not be disposed to agree in opinion with me, that it is more than probable, indeed, that it is scarcely to be doubted; but that this patient must have got, at the hospitals, to which he had applied for relief, mercurials, either alone or combined with his purgatives. If that was the case, we have already an instance of the beneficial influence of chlorine on the secretion of bile, when mercury had failed. I am, of course, aware, that *this* case is by no means conclusive on so important a subject.

If it be supposed, that chlorine has a specific influence on the action of the liver, (and this is the opinion I have formed,) and that that action consists in an influence on the secretions and excretions of the organ, we shall have no difficulty in accounting for its utility in the foregoing *form* of jaundice. But, whatever may be the way, in which we may choose to explain its beneficial powers in this disease, is of comparatively little importance in practice—we have, at least so far as one case extends, ascertained that which is of more consequence, viz. the fact, that it is beneficial; and, I am happy to have it in my power to support the conclusions, to which the case leads us, by the highly respectable testimony of DR. JAMES JOHNSON. This gentleman observes, “The Nitro-muriatic acid bath promises to be very serviceable in jaundice. In the case of a child of my friend MR. WEBSTER, Surgeon of the 51st regiment, afflicted with *obstinate jaundice*, the great affusion of bile into the intestines, which *almost immediately* supervened on the employment of the bath, afforded a fine specimen of the strong sympathy, which subsists between the skin and the biliary organ.”* I Need not observe that, if this agent, when employed in a fluid state,

* See “A Treatise on Derangements of the Liver, &c., by JAMES JOHNSON, M. D., &c. London 1820.”—5rd Edition, p. 79.

be capable of producing so remarkable an effect on the secretions of the liver, we have every right to expect from its action effects still more important, when assisted by circumstances the most favourable to its operation.

CASE B.

THE following case is transcribed, nearly verbatim, from notes taken at the period of its occurrence.

September 23rd, 1821. This day I was requested to visit E. A., an unmarried lady, aged about thirty-five, residing in lower Dorset-street. Her liver is evidently much enlarged and hard, not very tender on pressure. She says she has, at all times, a sensation of dragging in the right side of the abdomen, an incapability of lying on the left side, and a feeling of oppressive weariness in both her shoulders. She is pallid, and appears much emaciated,—bowels constantly demand the influence of purgative medicine to secure an occasional evacuation, which is almost always of a dirty ash-colour,—urine variable, but generally turbid and of a deep brown colour,—skin very harsh, dry, and extremely itchy at night,—feet slightly œdematous,—appetite not very deficient,—digestion much impaired. There does not appear to be much febrile excitement.

This lady has tried many remedies, and consulted many medical practitioners. She is positive, that she used a great deal of mercury, as she was made both to rub it on her side, and to take it internally, until her mouth was very sore ; but thinks it was rather injurious than beneficial to her.

She attributes her complaints to extreme mental anxiety, arising from numerous domestic calamities ; which commenced upwards of a year ago, and which, in appearance, first operated injuriously on her constitution, by causing a suppression of the menstrual discharge, which has not returned for the last nine months.

She appears to be perfectly aware of the seat of her complaints ; and says, that her liver has been several times, within the last three months, in a better, and once in a worse state, than it is at present. She dates the commencement of hepatic disease five or six months back : and remarks, that, about three months ago, she got so much better, that the yellow colour of her skin, which is at present very considerable, had disappeared ; that she regained some flesh ; and that she had strong hopes of obtaining a permanent cure, of which, she says, she now despairs. Her mind appears to be in a very irritable and desponding state.

I have ordered the general application of chlorine, in the dry form, for half an hour each day, at the temperature of 104, Ft., and aqueous vapour and chlorine to be directed in a stream on the region of the liver, for fifteen minutes at a time, daily. I have also desired, that her bowels shall be regulated by the following pills, so as to secure one evacuation in the twenty-four hours.

℞ Scammonii,

Aloës Socot:

Saponis ā. ā. ʒss.

Syr. cort: aurant: q, s. ut ft. massa, in pillulas viginti dividenda; e quibus sumantur duæ vel tres pro re nata.

October 7th. I have seen this lady occasionally since the 23rd ult. She has most steadily persevered in the system of treatment laid down. Her mouth and throat are a little sore, the secretion of saliva is increased, and there is a thick papular eruption over the region of the liver, in consequence of the topical application of the chlorine and aqueous vapour. There appears to be a salutary change commencing in the state of her complaints. She is not at all so despondent, but has now some hopes of being cured. Her bowels are acted on with more ease; and the discharges, although still very unnatural, have somewhat the appearance of being tinged with a healthy, but

scanty bile. She remarks, that her skin is very dry, harsh, and constricted; yet she now perspires occasionally, which, previous to the employment of the chlorine, she had not done since the commencement of the disease. The itching is nearly removed. The size of the liver is not perceptibly altered. I have made no change in the treatment.

October 20th. The state of this patient wonderfully improved. Her bowels have become so regular, that she scarcely requires any medicine on their account. The stools are, for the most part, bilious; occasionally, however, whitish, frothy, and fetid. Urine much paler and clearer,—sleeps profoundly the greater part of the night,—size of the liver evidently diminished,—almost all the uneasiness in her shoulders has subsided,—much less difficulty in lying on the left side, which she is now obliged to do, in consequence of the irritation and eruption that has been excited in the region of the liver. There is also a universal but mild crop of papulæ. The only alteration, which I have directed, is, that the general application of the chlorine should be united with that of aqueous vapour, and that the topical applications should be discontinued. The former alteration I have made in consequence of the very dry, harsh, and mealy state of her

skin ; and the latter, as the irritation, which has been excited in the right hypocondrium and the epigastrium, is so great as to render their continuance impracticable, without causing much distress.

28th. I was sent for to-day in a hurry, to see this patient. I found her in a state of great joy ; and I was informed, that last night there had been a slight return of the menstrual discharge ; and that there was, since I had seen her, a continued and rapid amendment in the general state of her health. I advised her to limit the application of chlorine to the lower half of her body, with the view of determining to the pelvis ; and to go into the apparatus as soon as she possibly could.

31st. She used the chlorine, as directed, every day since, at temp. 108. There has been a full menstrual discharge, to her very great satisfaction. As she feels somewhat exhausted, I have now ordered the employment of the chlorine to be, for some days, interrupted.

November 10th. The amendment has continued,—the colour of her skin is almost natural,—the liver can scarcely be said to be enlarged,—her bowels, instead of being constipated, are disposed

to be preternaturally loose,—urine much lighter-coloured and clearer,—œdema of feet entirely gone. The employment of the chlorine, both general and topical, to be renewed.

This patient may be now considered as perfectly restored. She used occasionally laxative medicine; and often employed the chlorine, for a week at a time, both generally and partially, during the entire of last winter. She is at present at a friend's some miles from Dublin, for the purpose, to use her own phrase, of making her miraculous recovery permanent, and is using the *leontodon taraxacon*.

The foregoing case I consider as extremely illustrative of the great and salutary powers of chlorine in chronic enlargements of the liver. The degree of emaciation, and the tendency to dropsy, denoted by the œdematous state of the feet, were symptoms of so serious a nature as to leave little hopes from the best directed application of the usual remedies. I must admit, that, when I entered on the treatment of her case, I had but little expectation of success. I was not then so fully acquainted with the efficacy of the remedy. However, since this case occurred, I have had several analagous ones, in hospital practice, whose termination was equally successful;

but which I shall not now relate, as I think the present is sufficient for my purpose.

What, it may be asked, was the *immediate* cause of the favourable result? I would answer, partly the specific influence of the chlorine on the action of the liver; and partly the local irritation, which it produced in the skin covering this organ. The very seasonable return of the menstrual discharge, and the preternaturally lax state of the bowels, which supervened during the treatment, and which were, no doubt, the consequence of it, had also a very considerable, and a very beneficial influence, in the removal of the disease.

From this case and the former one, as well as from several others, which I have to relate, no doubt exists in my mind of the power of chlorine to exert a specific influence on the secretions of the liver. We know, from general experience, that one of the most efficacious ways of subduing a tendency to disorganization, or even an actual alteration in structure, of a glandular part, is by increasing and modifying its secretory actions. In this way, then, do I conceive that the remedy acted, at least in part, in the foregoing case.

Practitioners are, in my opinion, too neglectful

of employing a continued irritation of the skin, or a discharge from this organ, for the relief of deeply seated viscera, when affected by chronic disease. In the foregoing case, and in many others, I have, as far as I am able to judge, obtained from them very considerable assistance.

CASE C.

THE following case I have still under my care: and although it is, therefore, in some measure, uncertain what termination it may have, I think it right to take the present opportunity of laying it before the profession; because I am of opinion, that the advantages, which have been already gained by the treatment, are such as to render it very probable, that the remedy will be found extremely useful in one of those affections of the liver, which is certainly least within the power of medicine.

The subject of the case is a married lady, aged about forty-five; the mother of several children; and, though of an indolent habit, of a very anxious disposition.

She came to town on the 20th of February last, from ———, to place herself under my care. I saw her the following day: she was a

little jaundiced, much emaciated, and complained of a constant pain at the lower part of the sternum, so circumscribed, that it could be almost covered with the end of a finger. This, however, appeared to attract her attention but little, compared with a pain, which came at intervals, and which she referred to the convex edge of the cartilages of the false ribs on the right side. This occasional pain harassed her so often, that she was seldom three days free from it, and sometimes not even one. When it came on, the torture was almost intolerable : it caused the perspiration to burst forth from every pore of her face ; and the only relief, which she obtained, was from sitting bent forward, making, at the same time, as much pressure as she could on the part affected. She was also in the habit of using quantities of opium. In general, as long as the pain lasted, there was nausea, and sometimes vomiting. The liver felt tumid in the epigastrium, but did not sensibly descend below the ribs on the right side. Appetite very small,—digestion painful,—the food frequently becoming sour on the stomach, and, on other occasions, causing an oppressive fulness and flatulence. The state of her bowels subject to great irregularity, sometimes exceedingly constipated, yet occasionally purged ; but the stools always unnatural in their appearance. Urine variable, but generally scanty and turbid,—tongue very foul in a morning.

These complaints had been of four years standing, she could not attribute them to any particular cause : the dyspeptic symptoms, and irregular state of the bowels, had long preceded the jaundiced state of the skin, and pain in the hypochondrium.

There was every reason to suppose, that all the usual resources from medicine had been tried ; as she had been, for a long time, under the care of highly respectable practitioners, in the north of Ireland.

It will easily be seen, that the above case was one, in which I could not rationally have hoped to be of much use ; yet I may be permitted to observe, that I entered on the management of it with great zeal. The extreme distress, which the unfortunate lady suffered, was of itself quite sufficient to awaken the deepest anxiety to benefit her, but there was also another motive : she had been sent to me at the request of a very particular and excellent friend, who, from partiality, had represented to her that I was most likely to serve her.

That I might, before I entered on the treatment, be completely put in possession of the symptoms, under which she laboured, I deferred doing

any thing on the day on which I first saw her; and requested I might be sent for, as soon as a paroxysm of the pain returned. I had not long to wait; for, at a very early hour the following morning, I was called up; and, on going to her, I found her in a state of extreme agony, in her bed, crying out and writhing from, apparently, the most intolerable pain. I immediately administered, according to her usual custom, a dose of laudanum, and had flannel, wrung from hot water, applied to the seat of distress. She soon appeared to be a little relieved, and sunk into a slumber, in which I left her. Having returned, in the course of the day, and finding the pain subsided, I ordered as follows:

R. Infusi gentian. compos. ℥iss,
Carbonatis sodæ, gr. xv,
Ft. Haustus, quotidie sumendus, mane, meridiè
vespereque.

R. Pulveris Rhei,
Aloës. socot.
Saponis ā ā ℥ss,
Syrupis Zingiberis, q. s. ut. ft. pillulæ viginti,
quarum sumantur duæ vel tres, hora somni, alternis noctibus.

I moreover directed the general application of chlorine, in conjunction with watery vapour, at the temperature of 98, Ft., for twenty minutes daily; and a similar topical application to the region of the liver, for ten minutes at a time, every second day.

This system of treatment has been now continued without any material alteration for nearly six weeks; except that lately she has not remained so long in the apparatus at each operation, in consequence of the increased sensibility of her skin to the action of the chlorine? Her mouth and throat have been made sore; there is an increased discharge of saliva; and the skin, over the region of the liver, is in a state of considerable irritation. There is also a general eruption of papulæ. The amendment has been such as must appear extraordinary to every one acquainted with the obstinacy and intractable nature of such cases. From five days after she had begun the employment of the chlorine, there was a sensible diminution in her sufferings; and, for the last eight days, she has not had any return of the periodical pain. The pain seated in the epigastrium is almost entirely removed. There is also, in other respects, a very material improvement. Her colour is much less yellow, and she appears to be regaining her flesh. On the whole, I have the greatest hopes of being able to accomplish the cure of this originally very hopeless case.

That the above is a case of gall stones, cannot, I think, be doubted; but I am much at a loss in what way to account for the salutary influence of the remedy. What portion of the amendment is to be

attributed to the simple tranquillizing influence of the aqueous vapour? What to the local irritation excited in the skin, over the region of the liver? Is it likely, that any portion of the relief was owing to a solvent power exercised by the chlorine on the calculi? Although there is not, certainly, any thing improbable nor incompatible, with our knowledge of the laws of the animal economy, to lead us to consider, *prima facie*, any of these suppositions incorrect, I am disposed to believe, from my knowledge of the influence of the remedy in other cases, that it principally acted in a beneficial manner by its influence on the secretions of the liver; and probably produced such a change in them as not only suspended the further increase of the size of the calculi, but also, perhaps, caused their diminution, by a chemical influence on the surface of those, that had been already formed.

It may be supposed by some, that the biliary calculi had been expelled into the duodenum; or that they had got into some situation, where they ceased to cause distress. I am not, however, after a careful consideration of the case, any way inclined to this supposition; for I think I can safely say, there was not any calculi voided by stool. I had given particular directions to have the discharges regularly examined; and the patient, who knew the nature of her case, was her-

self exceedingly on the alert to this circumstance. Moreover, the *gradual* cessation of the pain argues very much against the truth of such a supposition.

CASE D.

I SHALL relate only another case, under the present head. In June 1821, I was consulted by MR. T., a gentleman holding a respectable situation in a public office; of sedentary habits, arising from the nature of his employment; having a pallid complexion, and delicate form; and aged between thirty and forty.

He complained of considerable pain in the right hypochondrium, some tenderness on pressing in the epigastrium, but no very perceptible enlargement of the biliary organ. The pain was seldom acute. It was a feeling of oppressive fullness, much increased by certain positions; such as leaning forward while writing, stooping to lift any object from the ground, wearing his vest or coat tightly buttoned; in short, by any cause which diminished the capacity of the abdomen, and consequently increased the pressure on the viscus, which was the seat of disease. He was observed to be exceedingly restless in his manner, owing to a constant disposition to vary his posture, in hopes of obtaining one in which

he would be more at ease. Although this pain or uneasiness was not constant, he was seldom entirely free from it ; and, when it existed, it was subject to great variety, in respect to its severity. It was always much increased by the slightest excess. His bowels were very irregular, sometimes purged and sometimes constipated. The discharge often resembling pitch, and, on other occasions, yeast. He remarked, that, when his stools were pitchy coloured, the state of his mind was almost intolerable in consequence of extreme irritability. He was also occasionally subject to morbid sensibility of his bladder, being obliged, at times, to make water nearly every half hour. He had a troublesome cough, his pulse was accelerated beyond the natural standard, but without any increase of strength. He said he had lost his flesh, that his mind had become exceedingly despondent, and that he often could not get rid of an idea that he would very soon die ; and added, that he was unequal to the least exertion, either mental or corporeal ; and that he could not walk a single street without being thrown into profuse perspirations. He is subject to considerable flatulence after taking food, and sometimes to acidity of the stomach. He has scarcely any appetite, particularly for his breakfast ; rests very badly at night, seldom sleeping until near morning ; and awakes very much unrefreshed, with a remarkably foul tongue and mouth.

He has used mercurial alteratives, laxatives, stomachics, and a variety of other remedies ; has in general obtained from them temporary relief, but does not think that he was ever entirely free from the pain in his side, for an entire week at a time, since it commenced four years ago. He does not attribute it to any particular cause.

The benefit, which this gentleman received from the use of chlorine, was most remarkable. He had had, for some days previous to his applying to me, a very severe attack of his complaints, accompanied by the disordered state of his bowels, which has been already alluded to, and by great irritability of his bladder. I conjoined, with the administration of the chlorine, a mild laxative : *Infus. sennæ c. sulphat. magnes.* In the course of forty-eight hours, there was a most copious bilious discharge from his bowels ; all distress suddenly ceased in his side, as well as in his urinary organs ; and his mind became perfectly free from the state of terrible hypochondriasm, with which it was overwhelmed. He continued the employment of the chlorine for ten days, when, his mouth and throat being rendered very sore, and a general and thick eruption produced, it was left off, and a course of nitrous acid with laxatives recommended. These were persisted in for some weeks ; and this gentleman is now, and

has been ever since, in the enjoyment of better health, than he previously had for several years.

The foregoing case may, I think, be considered as an example of a plethoric state of the liver, accompanied by a strong tendency to chronic inflammation and enlargement. It was immediately relieved by an increased secretion of bile, which it is the property of chlorine to produce, and this with so little irritation or excitement in the system, that it might with safety be administered in the state of acute inflammation.

That which will most surprise a person, unacquainted with the powers of this remedy, is the rapidity with which all the distressing symptoms subsided. This is, however, only what may be expected in analogous cases; for chlorine so effectually increases the discharge of bile, and this so completely relieves the congestion, which is the source of distress, that, in almost all analogous cases, similar results will be found to occur. And here I will take the opportunity of observing, that, when the loaded state of the vessels of the liver have been relieved by the action of the remedy in question, the tendency to a return of a similar state is not, by any means, as far as I can judge, so strong, as when the vessels have been disgorgeed by the influence of mercury or purgatives.

Let me here observe, that I do not wish the reader to conceive, that the preceding four cases are the only instances of disease, purely hepatic, in which I have tried the employment of chlorine; much less do I wish him to suppose, that I have found it an infallible remedy in every case in which it has been employed. The cases here related, form but a small proportion of the entire submitted to treatment. I have selected them as being the most illustrative of the salutary effects of the remedy; and, in another part of this essay, will be found some general observations respecting its influence on those cases, which I do not here relate.

CASES, IN WHICH THE PRINCIPAL DISTRESS WAS NOT REFERRED TO THE LIVER; ALTHOUGH THERE WAS EVERY REASON TO SUPPOSE, THAT THIS ORGAN WAS THE ORIGINAL SEAT OF DISEASE.

It is very generally known, that diseases of the liver, sufficient to cause most alarming symptoms in other organs, may exist without attracting the attention of the patient, or even of the practitioner.* The ancient physicians were not

* See "Mémoires sur quelques Maladies du Foie; qu'on attribue à d'autres Organes, et sur les Maladies dont on fixe ordinairement le Siège

unacquainted with this important fact. They observed, that, although hepatic disease was sometimes attended by considerable pain in the region of the organ affected, it often produced irremediable disorganization before any alarm was excited; and, as they held the erroneous opinion, that the substance of the liver was insensible, while its coverings possessed a high degree of sensibility, they considered, that the former class of diseases, (or those attended by pain,) were seated in the membranes, and the latter in the parenchyme.

It must be admitted to be in appearance very extraordinary, that diseased action could go on in a sensible part without exciting pain; and it is even more extraordinary, that an organ in a diseased state, could excite pain in a remote part, while it is itself free from all painful sensations.* Both, however, are observed to be the case

dans le Foie, quoiqu'il n'y soit pas, par ANTOINE PORTAL." In "Acad. des Sciences, 1777." And, by the same, "Observations sur la Nature et le Traitement des Maladies du foie. Paris, 1813." See also Dr. JAMES JOHNSON'S Work already referred to, and "An Inquiry into the Effects produced on the Brain, Lungs, and other Viscera, &c., by Disease of the Liver;—by THOMAS MILLS, M. D., 1819."

* My late respected preceptor, Mr. ABERNETHY, was in the habit of elucidating in his lectures this pathological fact, by instancing the convulsions, which could be produced by a worm in the alimentary canal of a

in diseases of the liver. I have seen many instances of very serious hepatic disease, (as was proved by dissection,) which, during the life of the person, had not attracted any attention; and others, where there was scarcely any uneasiness in the region of the liver, but considerable pain in some part more or less distant. A practitioner should, therefore, always remember the uncertainty of the existence or non-existence of pain as a sign of the presence or absence of a diseased state of the biliary organ. It is nevertheless, too frequently, almost the only symptom which obtains attention.

I will also take the liberty of observing, in this place, that, in my opinion, the views of practitioners, respecting the *seat* of pain, in hepatic diseases, are, in general, much too confined. They seldom inquire for painful sensations, except in the right hypochondrium; and when they attempt to ascertain the existence of liver disease by abdominal pressure, they generally confine this to the margin of the ribs on the right side. There can be nothing more erroneous. Although I admit, that, when there is pain pro-

child, although the irritation excited by the worm, was not sufficient to cause any painful sensation in the abdomén. Every Surgeon is acquainted with the violent sympathetic effects, which often spring from *latent* disease in the urethra.

duced by disease of the liver, it is generally referred to the right side, yet, I maintain, that it is not unusually seated in the left side, and, very frequently, in the epigastrium; where it is often mistaken for gastric pain, and the patient treated as if he had a disease of the stomach. Moreover, although, on some occasions, it is possible to ascertain, by pressing round the edge of the ribs on the right side, whether the organ be enlarged or preternaturally sensible, this can, almost always, be much better done by pressure in the epigastrium.

It is often thought, that the right shoulder is the only remote part in which uneasy feelings are excited by disordered states of the liver; this is, however, very far from being always the case. Remote pains, resulting from hepatic disease, are often felt in the left shoulder, sometimes in the arms, or in the lower part of the scapula. I have known them to exist in the front of the abdomen, in the region of the umbilicus, &c. &c.; and I myself, once the subject of severe liver disease, experienced greater distress in the loins than in any other part.

I return, however, to the more particular object of this part of my paper, from which I have been insensibly led, viz. to relate some cases, in

which the principal complaint was not referred to the liver, although the mischief was clearly produced, in the first instance, by derangement of this organ.

The sympathetic affections, which result from hepatic disease, are so frequent, that I believe I may, with great truth, affirm, that there is scarcely an important organ in the body, whose functions are not occasionally disordered by a wrong action of the liver. Is there any practitioner, who cannot immediately recall to his memory numerous instances of disorder of the brain, of the lungs, of the heart, stomach, bowels, uterus, kidneys, skin, &c. &c., which have sprung from this source?

To relate even a single case of each variety of sympathetic disease, which depended on disordered liver, and which, I have had occasion to treat with chlorine, would very far exceed the limits assigned to this pamphlet. Nor is such a recital necessary, my object being simply to prove the general fact, that chlorine will be found a valuable remedy, not merely in those cases, in which the disease was confined to the liver itself, but also in those where diseases of the liver produced serious disorder in other parts. I shall, therefore, merely relate a few from those which

have occurred to me ; and, in making the selection, I shall choose such as I think will most clearly and forcibly elucidate the position.

THE connexion, which exists, both in health and disease, between the liver and heart, is most intimate. This is exactly what might be expected, from a consideration of their anatomical and physiological relations. It is easy to conceive how immediately every variety in the state of the circulation of the blood, through the heart, must influence the circulation in the liver. If, from any cause, the passage of this fluid through the right side of the heart be obstructed, the obstruction immediately exercises an influence on the circulation of the liver, and causes in this organ a similar obstruction. This is the reason why we almost uniformly find, that the liver is gorged with blood, whenever there is, from any cause, a preternatural accumulation of this fluid in the right cavities of the heart.*

* “ Dans presque tous le cas de maladies du cœur, en effet, le foie devient le siège d'un engorgement sanguin que j'ai souvent constaté sur les cadavres, et qui donne à ce viscère, sur-tout dans les dernières périodes de ces affections, un volume beaucoup plus considérable que dans l'état naturel. Alors il est facile de sentir cette tuméfaction à travers les parois abdominales ; elle devient même quelquefois si considérable, que le bord

This influence of the heart on the liver may be considered as purely mechanical; and we also find, that the latter has the power of acting on the former in an analogous way. Thus, enlargements of the liver may press the diaphragm upwards into the cavity of the thorax, and, by diminishing the size of this cavity, impede the motions of both the heart and lungs: or the same state of the liver may, by pulling on the diaphragm, drag the pericardium, and consequently the heart; and, in this way, interrupt, very much, the functions of the latter organ.*

These organs are, moreover, capable of influencing each other, as much by their sympathetic relations, as by their anatomical connexions. That the organ, which is the great agent in circulating the blood, should be connected, by the

tranchant du foie dépasse souvent de beaucoup le bord inférieur des parois de la poitrine." CORVISART sur maladies du cœur, Paris, 1811, p. 445—4. See also p. 452.; and PORTAL, Malad. du Foie, p. 530, and SENAC.

* " Le volume du foie étant augmenté, ou seulement le lobe gauche horizontal du foie étant trop tuméfié, alors des palpitations du cœur, des syncopes surviendront avec un resserrement de la poitrine, de sa partie moyenne et inférieure particulièrement; il y aura des douleurs, ou des engourdissement dans les épaules et dans les bras, jusqu'aux coudes, et mêmes de tout le bras; enfin le malade éprouvera la maladie que les Anglais ont depuis quelque temps appelée *Angine Pectorale*. PORTAL, *Maladies du Foie*, p. 42.—See also " Brera de Stenocardie" or *Angina Pectoris*.

closest sympathies, with those which serve to prepare or purify this fluid, is only what must, in hypothesis, be expected. That the liver is as much an organ for this purpose as the lungs, I would be disposed to maintain.* Can then any sympathetic connexion, which we may remark between the heart and liver, surprise us? No, as I have said, we must from hypothesis expect this connexion, and it is known, that we find it in practice. † I believe it is impossible for even the most trifling functional derangement of one of these organs to take place, without sympathetically affecting the other. ‡

On these occasions it is of the first importance to ascertain which is the organ primarily affected. This is often not very easy to be done. We can only attempt it by accurately inquiring into the history of the case; and by watching, with great care, the influence of the treatment,

* See "Anatomie Generale par BICHAT."

† Every one, who has been much in the habit of dissecting, must have observed the frequent combination, in the same subject, of organic disease of the heart, liver, and lungs. Numerous cases of this kind may be found in BONET, LIEUTAUD, MORGAGNI, PORTAL, &c.

‡ "We know that disordered states of the liver will have such a temporary sympathetic influence on the heart, as to lead us often to fear, that there is serious organic action in that organ or its vessels; which fear is removed by observing the cardiac symptoms decline as the functions of the liver and digestive organs become restored."—JOHNSON, *Loc. Cit.* p.162.

which we may adopt. In these doubtful cases there is, however, one consolation, that, if we follow a cautious line of conduct, we can do no harm, whether we happen to be right or wrong in our opinion respecting the organ, which may have been the original seat of disease. For, if we do no more than relieve symptoms, we must do good; not merely by the present relief which we afford, but by preventing the reaction of the secondary on the primary affection, and by contributing, in this way, to subdue the primitive evil. I would not nevertheless, by such a remark, wish to be understood, even in the slightest degree, as undervaluing the importance of ascertaining the original seat of disease. I merely make the observation to prove, that, in doubtful cases, we will not go very far astray if we remove the prominent distress.

I shall now proceed to relate a case of disordered action of the heart, which had been originally produced, and was still kept up, by a morbid state of the biliary organ.

CASE E.

JUNE 3rd, 1821. I was this day consulted by Mr. G., aged between thirty and forty: a gentleman of an active disposition; but, obliged,

from the nature of his avocations, to lead a very sedentary life : naturally of a full habit and sanguineous complexion, but now sallow-looking and emaciated. He complains of distressing and almost constant palpitation, with an occasional tendency to syncope. The former is greatly increased by bodily exertion or mental anxiety, but the latter frequently comes on without any apparent cause. His pulse, at present, is irregularly intermittent, and not more than seventy-four in a minute. He also complains very much of a sensation of constriction round the middle and lower part of the thorax, accompanied by a numbness, which extends from his shoulders down his arms to his elbows. This comes on only at intervals. He cannot bear the most trifling fatigue ; not only on account of its producing violent palpitation, and most distressing sinking sensations in the region of the heart, but also on account of the profuse and exhausting perspirations which attend it.

Although it is only within the last year, that the symptoms have come on, of which he now complains so much, he observes, that, for four years, that is, ever since he entered on his present sedentary avocations, his health has been more or less affected. About three years ago, he had an attack, for which he was very largely

blooded, and which he was informed, by his medical attendants, was an inflammation of his liver. Although he has not at present any pain in his right side, yet he feels in it a kind of uneasiness, which leads him to conclude, that "all is not right within." He cannot lie on the left side at night, nor bear his clothes of a moderate degree of tightness round the hypochondria. The epigastrium appears full, and he shrinks from my touch, when I press at the lower part of the sternum.

His bowels are subject to great irregularity, being however most generally constipated; and then the symptoms of disease of the heart are at their height. His appetite is capricious; seldom good; and the digestion is, for the most part, attended by fulness and flatulence. If his stomach is permitted to remain many hours without food, the sense of sinking, which takes place, is almost intolerable. He has not particularly observed the appearance of his discharges; but says he knows, that his urine is often very turbid. He scarcely ever perspires; and he finds considerable difficulty in keeping himself warm at night, his skin often feeling like a piece of *cold marble*.

Has taken a great deal of medicine; but does not appear to have undergone, at least latterly, any regular system of treatment. I have ordered

the following purgative, with the view of ascertaining the state of the biliary secretions.

R. *Magnesiæ sulphatis*, ℥iv,

Infus. Sennæ, ℥iss,

Tinct. Jalap. ℥i,

Fiat haustus tertiis vel quartis horis sumendus donec bis dejecerit alvus.

June 4th. Has had several copious discharges, having taken three draughts before any effect was produced. The dejections have scarcely at all the appearance of fœces. I cannot compare them to any thing else than a jelly, beat up with a quantity of mud. I have ordered for him as follows:

R. *Aloës socot.*

Scammonii, ā ā gr. xx,

Extract. Rhei, ℥ss,

Baccarum Capsici pulv. gr. vi,

Olei lauri Cinnamoni, gt. iv,

Fiant pilulæ octodecem, e quibus sumantur duæ, hora decubitus, secundis noctibus.

The chlorine, in conjunction with aqueous vapour, to be applied to the general surface for half an hour daily, the temperature of the apparatus being 110, Ft.

I feel it to be unnecessary to trouble the reader with the daily reports of this case. I shall, therefore, merely communicate the result. He

remained under treatment for nearly six weeks: there was a gradual improvement in the appearance of his discharges: they became, at last, perfectly natural and regular, without the assistance of medicine; and, exactly in the same proportion, the symptoms which depended on derangement of the functions of the heart also subsided. The plan, at first adopted, was pursued, with very little alteration, during the entire treatment. Nor did any thing very particular occur, except that it was found necessary to use great caution in the administration of the chlorine, in consequence of a peculiar irritability of the skin of this patient. Indeed the *chlorine rash*, (which I shall hereafter describe,) was so severe as to oblige me to suspend several times the employment of the remedy; and, on scarcely any occasion, after the first three days, was it in our power, in consequence of the pricking and smarting sensations, which were in general created by the action of the gas, to permit him to remain longer in the apparatus than about fifteen minutes at a time. Yet his mouth and throat were made very sore.

This patient is now in the full enjoyment of health, and has been so ever since he left off the employment of the chlorine. He is indeed not only free from all symptoms of actual disease, but has also recovered his former characters both of mind and body.

As to the nature of the foregoing case, there is no room for doubt or conjecture. It was evidently an example of functional derangement of the heart, brought on and kept up by a disordered action of the liver and other digestive organs. The abdominal disease had commenced, at least three years before, in the form of an acute hepatitis, and probably in consequence of the new and sedentary habits of the patient. It will be admitted, that the chlorine had as powerful and as salutary an action on the liver as could have been expected from the best directed mercurial or alterative course. The cure, moreover, has, in my mind, been more permanent than we could expect, under all the circumstances, from the action of mercury; and the treatment, instead of causing any debility, had, from the beginning, a directly opposite effect, as was proved by the almost immediate cessation of the *debilitating* perspirations.

THE union, in the same person, of hepatic and dropsical disease is so extremely frequent, that I do not recollect to have ever examined the body of a patient, who had died with general dropsy or with ascites, whose liver was not more or less diseased.

Dropsy is very seldom idiopathic. It is, as far as my experience goes, almost constantly symptomatic of visceral disease, either organic or functional; and, of all the viscera, whose derangements have the power of exciting dropsy, the liver may be said to hold the foremost rank. This will be so readily admitted by every practitioner, who has had an opportunity of investigating disease by dissection, that I feel it to be unnecessary to dwell on the subject; and, such as have not been so fortunate, will find in LIEUTAUD, TULPIUS, DE HAEN, D. MONRO, MORGAGNI, HALLER, HAZENHORL, STORK, PORTAL, RUYSCH, DIEMERBRÆK, SANDERS, &c., numerous accounts of dissections of dropsical patients, which, in the clearest manner, demonstrate the truth of the assertion.*

It was the opinion of some of the older physicians, (I presume, in consequence of their observing the liver so often affected in dropsy,) that the disorganization, which occurred on such occasions in the liver, was produced by the pressure of the water in the abdomen, and they consequently concluded, that, whenever the latter existed, the

* PORTAL observes, L. C. page 513, " Il est bien plus fréquent de reconnaître des altérations dans le foie de ceux qui sont morts d'hydro-pisie, que de le trouver sain,"

other must be present. This theory served in appearance to explain the phenomena, which were daily observed. They were correct in their observations of the connexion, but were wrong in their conclusion: they mistook the cause for the effect.

It is unnecessary for me to inquire by what means it is, that hepatic disease produces serous infiltrations: it is enough for my purpose to prove that it can do so. Whether these infiltrations are caused by the obstruction afforded to the circulating fluids through the organ diseased; by the bile or its elements being retained in the circulating mass, and thereby disposing to dropsy, in consequence of their influence on the qualities of the blood;* by an increased action of the exhalent vessels, to relieve a preternatural determination of fluids to the part; † or by a dimi-

* “ Ou pourrait voir par nos experiences que la bile mêlée avec le sang en dissout les globules rouges. Voyez nos Memoires, T. 11, p. 279.” —“ mai le défaut d'excrétion de la bile et même son altération n'en sont-elles pas aussi des causes très-fréquentes? Cette humeur n'étant pas suffisamment excernée dans le canal intestinal pour servir à la digestion, et restant dans la masse des humeurs ou du moins les principes qui la composent, les altère et les dispose ainsi à hydropisie, comme cela arrive à ceux qui ont la jaunisse.”—PORTAL, L. C. p. 134, & 517.

† PARRY, “ Elements of General Pathology,” p. 101, and following ones.

nution of the action of absorption, is quite immaterial: my object is merely to allude to the connexion; and to prove, that, by relieving the original disease by means of the remedy in question, the dropsical affection will be made to subside.

I wish, however, to observe in a particular manner, that I do not, of course, by any means assert, that all dropsies, or even the greater number of these affections, depend on organic disease of the liver. I only maintain, that, in a large number of such cases, the liver is the original seat of disease. I think it is also necessary to mention, that, in my opinion, the nature of the hepatic affection, which gives rise to dropsical effusions, is by no means always the same; consequently, that the system of treatment, which will answer in one instance, may not be applicable to another. Here, as in all other cases, it is impossible to lay down any principles of universal application. It is in this impossibility, that the difficulties of practical medicine consist; and it is from this cause, that the necessity arises of a constant exercise of discretion and caution in the conduct of a medical practitioner.

There are few diseases, whose treatment is more empirical than that of dropsies. It should be ever recollected, that they are almost always symptomatic; that their causes are extremely va-

rious ; and that every variety requires a system of treatment more or less distinct, according to the organ primarily diseased, and the nature of the disease in that organ. Need I then mention how incorrect it is to prescribe for dropsy by its name? I am much disposed to believe, that such a disease should scarcely exist, as an idiopathic affection, in our nosological tables. But I am making remarks, which have been long known to all scientific practitioners, and the truth of which is, at present, very generally admitted.

That the following case of incipient general dropsy had its cause in a wrong action of the liver, I think must appear from an examination of the symptoms, which presented themselves, and from the result of the treatment adopted.

CASE F.

AUGUST 10th, 1821, I was requested to visit E. G., a female servant, residing in Britain-street, aged about 28 years, and unmarried. I found her with her feet and legs so swelled that she could not wear either shoes or stockings. The tumefaction, which had the characters of œdema, extended considerably above the knee. She complained of a very oppressive fulness in the upper region of the abdomen, and some uneasiness was produced by pressing in the epigastrium. She was subject to occa-

sional pain both in the right and left hypochondrium, and was harassed, whenever she walked or sat upright, by a feeling of weariness in the shoulders. The abdomen was tumid, and afforded an obscure sensation of fluctuation. She could not lie comfortably on her left side, and was much disturbed during the night, by a dry, short cough. Her eyelids were tumid,—urine scanty, high-coloured, and exhibited, on exposure to heat, flocculi of animal matter. Her bowels were, in general, constipated, and the fœces very much of the colour of unbleached linen. Pulse frequent, but not firm,—appetite for solids much diminished; but she complained of thirst, particularly during the night. There had been no return of the menstrual discharge for three months, and to this she attributed her present complaints; “because,” said she, “the swelling came in my limbs exactly at the time at which I should have been unwell.” For the cessation of this discharge, she could not give any reason. It appeared, that she had been, for some years, subject, once or twice in the year, to what she called bilious attacks, which were accompanied by pain in her right side, and for which she was bled more than once.

For the present complaints, she had been under the care of an apothecary, without obtaining

any relief. I could not ascertain what medicines were administered.

The advantage, which this patient received from the employment of chlorine, afforded a most decisive instance of its energetic and beneficial influence. It caused so great an increase of the secretions of the liver, that, in the course of the first week, a bilious diarrhœa set in, which was soon followed by a complete cessation of all symptoms of disease. I admit, that, as this is not a general or common effect of the chlorine, it may be supposed, that it was accidental, and not in any way owing to the employment of the remedy. It was remarkable, that, in this case, although the action of the chlorine was so beneficial, there was no very determinate effect produced on the mouth. At one time the patient remarked, that her teeth felt as if she had been eating sour fruit.

This patient continued under treatment five weeks ; she did not use any other medicine, with the exception of a few of the compound colocynth pills ; and these were not continued longer than the three first days. The menstrual discharge appeared once while she was under treatment, and it is now completely re-established. She is at present residing in a family, with which I am intimate ;

and, having frequent opportunities of seeing her, I know her to be in full health.

It may be proper to mention in a particular manner, with respect to this case, that, every time the patient went into the apparatus, there was, as generally occurs, considerable diaphoresis; and she often assured me, that an increase of perspiration was kept up, during the entire of the twenty-four hours, i. e. from one application to another.

For the first three days, after the treatment had commenced, her thirst was very great; and the quantity of her drink much exceeded that of her urine. The thirst, however, soon diminished, and the quantity of urine increased. The proportion, which they bore to each other, during the first twenty-eight days, may be seen by the following tabular view. No account was kept after this period, for I then considered her convalescent.

DATE.		QUANTITY DRUNK.				URINE DISCHARGED.			
		lbs.				lbs.			
August	11	-	-	-	8	-	-	-	3
—	12	-	-	-	7½	-	-	-	3½
—	13	-	-	-	4	-	-	-	3
—	14	-	-	-	4	-	-	-	8
—	15	-	-	-	4	-	-	-	6
—	16	-	-	-	4	-	-	-	7
—	17	-	-	-	4	-	-	-	8
—	18	-	-	-	4	-	-	-	7
—	19	-	-	-	4	-	-	-	5

DATE.		QUANTITY DRUNK.					URINE DISCHARGED.		
		lbs.					lbs.		
August	20	-	-	-	4	-	-	-	5
_____	21	-	-	-	4	-	-	-	5
_____	22	-	-	-	4	-	-	-	4
_____	23	-	-	-	6	-	-	-	5
_____	24	-	-	-	4	-	-	-	3
_____	25	-	-	-	3	-	-	-	2
_____	26	-	-	-	3	-	-	-	2
_____	27	-	-	-	3	-	-	-	2
_____	28	-	-	-	4	-	-	-	3 $\frac{1}{2}$
_____	29	-	-	-	4	-	-	-	5
_____	30	-	-	-	3	-	-	-	5
_____	31	-	-	-	4	-	-	-	6
Septemb.	1	-	-	-	4	-	-	-	5
_____	2	-	-	-	4	-	-	-	7
_____	3	-	-	-	4	-	-	-	8
_____	4	-	-	-	5	-	-	-	9
_____	6	-	-	-	4	-	-	-	8
_____	7	-	-	-	4	-	-	-	7
_____	8	-	-	-	3	-	-	-	6

The consequences, which resulted from the treatment adopted in the foregoing case, are easily explained. By the remarkable increase of all the secretions, but particularly of those of the kidneys, skin, and alimentary canal, the serous fluids, which had been deposited in different parts of the body, were discharged; by the specific influence of the chlorine on the action of the liver, the functions of this organ, (which, in my opinion, was the original source of disease,) were restored to their natural state; and hence resulted the cessation of the morbid action of all the other parts, whose derangement had been the consequence of the hepatic disorder.

What advantage, if any, arose from the diaphoretic effects of the heated air, which was necessarily applied to the surface in conjunction with the chlorine? It is known, that DR. DARWIN recommended a trial of heated air as a diaphoretic for the relief of dropsy; but I am not aware, that either he or any one else put its influence to the test of experiment.*

From the case here related, no conclusion can, of course, be drawn on this subject, as chlorine was employed in conjunction with the heated air. However, as heated air alone is a remedy, which promises some assistance in this disease; and as, in consequence of the improvements, which have taken place in our means of applying agents to the surface of the body, it can easily be employed, no time should be lost in putting its influence to the test of experiment. It is scarcely necessary to mention, that its operation on the skin is, in many respects, entirely different from that of aqueous vapour.

As soon as I had an opportunity of observing cutaneous diseases on an extensive scale, my at-

* See "Zoonomia, Vol. II, Article iv. 2, 5, 8.—Sorbentia."

tention was, by many circumstances, forcibly roused to their connexion with the state of the liver. Indeed, the simple consideration of the manner, in which those medicines act, that have, in general, been found most useful in the treatment of a large proportion of the diseases to which the skin is liable, must, at all times, have convinced every one, who would take the trouble of reflecting on the subject, that a very great proportion of these diseases depend on the state of the biliary organ. In fact, I have so frequently remarked this connexion, that now I never think of entering on the treatment of any disease of the skin, until I have particularly inquired into the state of the liver.

While I admit, that I have not arrived at such accuracy of information, (nor do I know whether it be permitted that we ever shall,) as to be able to connect particular modifications of cutaneous disease with certain forms of hepatic disorder, I can with confidence assert, that, on many occasions, the aspect of the cutaneous disease has led me to suspect an hepatic affection, which, on examination, I have found to exist; and, by whose removal, I have removed the disease of the skin.

Although it appears to me, that practitioners do not regulate the treatment of diseases of the

skin, as much as they should, in consequence of their connexion with hepatic derangement, I am well aware, that the best authors on the subject of both dermoid and biliary affections give ample proof of their intimate acquaintance with this connexion.*

It would be in my power to enter into many details, respecting the connexion of cutaneous and hepatic disease; but, as the relation of cutaneous disease with the state of the internal organs in general is deserving of a separate consideration, I shall not here enlarge on this interesting subject.

I have preserved notes of numerous examples of skin disease, which were produced and kept up by disease of the liver, and which I have treated successfully by chlorine; but, as it is my intention to consider, on a future occasion, the general principles, which should regulate our con-

* See "Practical Treatise on Various Diseases of the Abdominal Viscera, by Dr. PEMBERTON, London, 1806," page 59.—Dr. DARWIN'S *Zoonomia*, Class ii. 1, 4, 6.—ABERNETHY "On the constitutional Origin and Treatment of Local Diseases."—"Practical Treatise on Derangements of the Liver, &c. by JAMES JOHNSON, M. D. &c., London, 1818," particularly page 72. PORTAL, "Maladies du foie, pp. 48, 534—5—6," and many other parts of his elaborate treatise. See also "An Inquiry into the Effects produced on the Brain, &c., by Disease of the Liver, by THOMAS MILLS, M. D., 1819," p. 75.

duct in treating cutaneous diseases, I shall content myself, for the present, with relating a single case out of the many, that have occurred. It is a case of that disease, which, in the nomenclature of Dr. WILLAN, is denominated ecthyma; and which, according to my observation, is almost always symptomatic of diseased liver.

CASE G.

DECEMBER 20th, 1820. Mr. G., of Capel-street, aged about thirty, of a sallow, anxious countenance, with dark eyes and hair, consulted me this morning. His legs and thighs are thickly covered with an ecthymatous eruption,—many of the pustules are maturing,—some are in a state of complete suppuration,—others have formed scabs, and there are numerous discoloured spots in the situations that were occupied by such as have healed. Those pustules, which at present exist, are very large, their colour very dark red, and their base hard and deep,—some of them indeed are so large that they resemble furunculi. He complains very much of the pain or soreness of those which are maturing. The crusts have fallen off some that were in the state of scab, and have left a round deep ulcer, which has no disposition to granulate. There have, from time to time, been a few pustules on the trunk and nates: there is one, at present,

in the state of suppuration, and two or three in that of scab. He has lost all relish for his food, although he continues to eat his regular meals. His tongue is very foul, particularly in the morning; at which time his mouth, he says, is filled with diseased secretions, that have a very unpleasant taste and odour. His bowels are extremely torpid,—urine high coloured, and in general turbid,—very considerable pain on pressure in the epigastrium,—almost constant pain or uneasiness in the right side, and his liver can, I think, be felt projecting a little below the cartilages of the ribs. He also observes, that he is remarkably languid and extremely uncomfortable in his feelings. He has laboured under this eruption, more or less, without intermission, for several months past; and has been prescribed for by two practitioners without obtaining relief. He says, he had the same eruption several times. To use his own language, he is always extremely bilious,—frequently harassed with pain in his right side,—had, in 1818, a violent attack of a similar eruption, which continued for many months; and, having got an inflammation on his liver, *the eruption disappeared spontaneously before he recovered,* and did not again trouble him until a few months ago.

This gentleman was under my care only four weeks. During the entire of this period, the

chlorine was applied every day, both generally and topically, for nearly forty minutes at a time, the temperature of the interior of the apparatus being 115, Ft. The only additional treatment was the administration of the compound colocynth pill, for the purpose of regulating his bowels. Before he had been ten days under my care, there was a most remarkable alteration. Every pustule was healed, and his discharges assumed a perfectly natural aspect. There would not have been any necessity for employing the remedy so long, but the patient himself anxiously desired to persevere in its use. His mouth was made slightly sore. There was no general rash excited on his skin by the chlorine, nor did its action on the pustules cause so much pain as might have been expected. The irritation excited in the skin, over the region of the liver, was however very considerable.

That the direct influence of the chlorine on the eruption was beneficial, I do not doubt; but I am also certain, that this influence alone would not have accomplished the removal of the disease. I make this assertion from long experience of the inutility of combating ecthyma by mere topical applications: I have never observed such to have more than a temporary influence; but the subject of the foregoing case has, to the present moment, remained perfectly well.

Ecthyma is one of those affections of the skin, which arises from a disordered state of the constitution, and which is very frequently mistaken for a secondary syphilitic eruption. This mistake is the more likely to be made, because mercury has very often a beneficial influence on the disease, and will frequently remove it altogether; but this, I conceive, is attributable to the action of the mineral on the liver, whose disorder is the source of the cutaneous affection. I cannot here avoid observing how much the science of medicine has been retarded in consequence of the disposition, which often exists among practitioners, to consider all diseases, which are curable by the same or nearly similar means, as identical in their nature. As the object of medicine is the prevention or removal of disease, it may be conceived, that distinctions beyond what appear of practical utility are of no advantage. This is not, however, the way to extend the boundaries of medical science. Although we may not, at present, derive advantage from minute nosological distinctions, the time will certainly arrive, when we shall be able to apply them to practice. There is, however, a medium to be observed; for, on some occasions, particularly with respect to cutaneous affections, subdivision has been carried too far. As long as there are, in reality, specific differences, advantage must arise from specific classification; but, when mere varieties are raised to the rank of

species, the difficulties of the science are increased, and confusion necessarily arises. Without wishing, in any way, to detract from DR. WILLAN'S merit, for having introduced much accuracy of language into the description of cutaneous disease, I must say, that his classification of these affections is, in consequence of the fault alluded to, almost entirely useless.

CASES, IN WHICH THE LIVER WAS THE PRINCIPAL SEAT OF DISEASE, BUT IN WHICH ITS DISEASE HAD BEEN PRECEDED BY A MORBID STATE OF OTHER ORGANS.

As the liver, when diseased, can excite disorder in other parts, in like manner, many of the organs of the body can, when in a morbid state, excite disease in the liver. Of all the examples, continually occurring to our observation, of the power which one organ has to excite disease in another, perhaps there are none more remarkable than those affections, which we observe to arise in internal parts, in consequence of remote external injury. That an injury of any organ or structure of the body should produce a sympathetic disorder in the remainder of the system is only what we would be led to expect, from a knowledge of the laws that regulate the animal

economy; but it is not so easy to explain, why one particular organ should often, on such occasions, be the only part which materially suffers; yet, that this is a common occurrence may be known by a reference to the records of surgery. Although the same source of information clearly shews, that there is scarcely any one internal organ, which may not be affected, in consequence of external injury of a remote part,* it would appear to be satisfactorily ascertained, that injuries of the head are most apt to be followed by such occurrences; and that it is the liver which most frequently suffers. †

* See SENAC "Traité de la Structure du Cœur." (Disease of the heart after injury of the head.),—BOHNIUS, "De renunciatione Vulnerum, seu Vulnerum Lethalium Examen—Lipsiæ, 1689," in 4to. (Mortification of great toe after injury of the head.)—"Surgical Observations, by CHARLES BELL, Part, 3, London, 1817."—"On Pulmonary Diseases in Connexion with Local Irritation, and consequent on Wounds and Surgical Operations."—KLEIN "Chirurgische Bemerkungen," p. 123,—(He asserts that disease of the spleen is a more frequent occurrence than hepatic disorder, after injuries of the head; and that morbid states of the liver have been observed to follow injuries of the shoulder joint and chest oftener than those of the head.)—See also JOB VAN MECREM, Liv. 23.—LANGONI. Act. Nat. Cur. T. II. Obs. 6.—MORGAGNI Epist. Lib. I, Art. 20, de Morb. Chir.—Epist. LIV. Art. 16.—Epist. XXIV. Art. 20.—Lib. III. Epist. XXVI. Art. 27.—LIEUTAUD, P. 1. Obs. 772.—Lib. I. Obs. 910.—Lib. I. Obs. 716.—Lib. I. Obs. 112.—Lib. I. Obs. 619,—&c. &c.

† See "De Hepatis Abscessibus, qui Vulneribus Capitis superveniunt. Auctore D. BERTRANDI." In "Memoires de l'Academie de Chirurgie. Tome IX. 12mo. or Tome III. 4to.—and in the same Vol. "Observations sur le Même Sujet, par M. ANDOUILLE.—RIOLAN. "An Ratione

The disorder, which may be excited in the liver, in consequence of injuries of the head, is subject to much variety, in respect to degree and kind. Very frequently it is merely functional, and quickly disappears. On other occasions, the functional disorder excited is alarmingly great. Some months ago, I had a remarkable example of this. A man, who had been for many years subject to a violent oppressive pain in the upper part of his forehead, so circumscribed, that it could be covered by the end of a finger, received a wound exactly in the situation of the part which was the seat of pain. The wound was not more than three-fourths of an inch in length. The periosteum was divided, but the bone was not injured. The wound was a simple incision, unattended by any contusion, and inflicted in such a manner that there could not have been

Venarum Purulentia Cerebri per Truncum Cavæ descendens ad Hepar. De Antrop. Lib. II, Cap. XXII." PORTAL "Observations des Maladies du Foie," p. 592.—HALLER "Disput. ad morbor Hist. T. III." p. 559. POUTEAU, "Œuvres Posthumes, Tome II," and "Melanges de Chirurgie," p. 133.—BIOT, in his Military Surgery, remarks, that of seven soldiers, who died in the military hospital of Strasburg, in the months of January and February, 1794, in consequence of wounds of the head, six exhibited on dissection abscess in the Liver.—BIANCHI, Hist. Hep. p. 102.—CHESTON'S INQUIRIES, Cap. III. et Obs. n. 12.—MEIBOMIUS, "De Abscessuum internorum Natura," &c.—MORGAGNI, de Sed. et Caus. Morb. Ep. LI. Art. 22. seq.—RICHTER, Chir. Bibl. V. D. p. 656. RITCH. "Diss. de Hepatis Abscessibus à Læsionibus Capitis, Hal. 1766."—BONET, Sepulchr. L. IV. Sect III. Obs. 16, &c. &c.

the slightest concussion. Immediately after the receipt of the wound, the pain, which had for years almost incessantly harassed him, suddenly disappeared. He therefore considered the occurrence of the wound a most fortunate event; and at his desire, it was dressed in such a way as to prevent its lips being brought together. In the course of two days, the system began to sympathize very remarkably. A sensation of horripilation and great sensibility of the surface of every part of the body set in. In twenty-four hours after this, the scalp and face were attacked by an œdematous swelling; but the skin was not, at first, in any way red. On the contrary, it was rather pallid; but the scalp became so extremely sensible, that not the least pressure could be borne. About this time, that is, three days after the wound of the head, the entire surface appeared perfectly jaundiced; indeed as yellow as I have ever seen it in any case of pure icterus. Matter formed in various parts over the scalp, and in the eyelids. The discharge from his bowels became whitish, not having the slightest appearance of bile; but his urine assumed so much the aspect of this fluid, that it seemed more like the contents of the gall bladder than any thing else. It was, nevertheless, sufficiently copious. A low muttering delirium now commenced, which soon became violent, and was

particularly marked by an unrestrainable propensity to tear the hair from his head, to pull with his nails at his lips, to beat his sides with his arms, and to gnash with his teeth. Whenever he sunk into a slumber, there was an almost continued grinding of his jaws, resembling that which so often occurs in children, from a disordered state of the alimentary canal and its appendages. He died (very much like a person in typhus) on the tenth day after the receipt of the wound, and seven days from the commencement of the symptoms of jaundice. On dissection, the liver and kidneys were the only parts observed to be morbidly affected. The structure of the former was perfectly natural; but there had been a complete suppression of the secretion of bile. The gall bladder was full of a mucous fluid, much resembling the white of an egg, transparent, colourless, and entirely void of any bitter taste. The kidneys were greatly enlarged. This enlargement appeared, however, to be the result of recent sanguineous congestion. Their pelvis contained the same kind of fluid which had been evacuated as urine. It was, however, in a more concentrated state, and of an extremely bitter taste. The contents of the cranium were in no way diseased. Whether the cessation of the secretory powers of the liver was, in the preceding case, the immediate cause of death, I shall not take upon me to deter-

mine. It must, however, be considered as a very remarkable example of the power of external injury to cause very serious functional disorder of the biliary organ.

When the structure of the liver is altered, in consequence of injury of the head, the disorganization which ensues is not always the same. Sometimes the liver becomes enormously enlarged, its natural texture being apparently uninfluenced. A very striking instance of this kind, I clearly remember to have seen, many years ago, at the House of Industry. The subject of the case was a female, aged between twenty and thirty years, who, in consequence of a blow on the side of the head, from a brick-bat which had been thrown at her, got concussion and a wound. The symptoms of concussion remained, more or less, for some days, and were succeeded by an increased degree of stupor. This lasted until her death, which took place about six weeks after the injury; being immediately preceded by convulsions. On examination of the body, a large abscess was found in one of the hemispheres of the brain, (I do not recollect in which,) and the liver was so enormously enlarged, that it weighed upwards of thirty pounds, and extended itself into almost all the regions of the abdomen. Its structure did not appear to be, even in the slightest

degree altered, if we make the exception, that it was rather paler than natural. Attention had not been attracted to this organ, during the life of the patient; nor do I now recollect the exact state of the general functions of the abdominal viscera, but the liver was so much enlarged, that the impression made on me by the examination of the body remains most vivid.* There was another remarkable circumstance connected with this patient's case. As I have mentioned, she generally lay in a state of stupor. She was observed, however, occasionally to rise, apparently insensible to every thing about her, (like a somnambulist,) to satisfy the calls of nature: Moreover, if she was roused, she would take food, and instantly after lapse, as it were, into a deep sleep.

If we credit the recorded cases of disease of the liver, which have succeeded injuries of the head, it would appear, that gangrene and an excessive accumulation of blood were, on such occasions, frequent occurrences; but it must nevertheless be admitted, that of all forms of disorganization of the liver, in consequence of injury

* Dr. JOHNSON, in his "Treatise on Derangements of the Liver," &c., p. 72, observes, "The most remarkable instance of this kind on record, (enlargement of the liver,) occurred to Dr. POWEL, where the liver weighed forty pounds."—In LIEUTARD, Lib. I. 567, will be found a similar example.

of the head, the formation of abscess, or purulent deposits, has been the most frequent.

It is particularly worthy of notice, that neither the degree nor kind of injury of the head has any influence in determining whether the liver shall suffer or not. In the case of functional disorder, which I have above alluded to, the wound was of the most trifling kind. There are also cases recorded, in which there had been no wound.*—BERTRANDI asserts that he found, in patients who had laboured under apoplexy, affections of the liver similar to those produced by injuries of the head.† It was supposed by POUTEAU, ANDOUILLE, and BERTRANDI, that the abstraction of blood from the veins of the leg, after injuries of the head, had a particular influence in causing, on these occasions, disease in the liver. If this opinion be founded in truth, (which, however, does not appear to me at all probable,) we might satisfactorily account for the less frequent occurrences of such accidents in modern times, as venesection in the leg is not at present so much in practice

* PORTAL. Loc. Cit. p. 594—5.

† “ On a en effet observé que ce viscère étoit en suppuration à la suite de l'apoplexie, du *coma*, et d'autres maladies de la tête, où il n'y avoit ni cause, ni signe de purulence.” BERTRANDI, Loc. Cit. p. 132, 12mo. Edition, of “ Mémoires de l'Academie de Chirurgie.”

as it was formerly. In several cases, on record, there can be no doubt, but there must have been previous organic disease of the liver, and that the injury had simply the effect of hastening its progress to a fatal termination; but there are also many other cases, which leave as little doubt of the liver having been, up to the moment when the injury was received, in a state of full health. It is remarkable, that, although the symptoms of disordered liver, arising from injury of the head, will sometimes warn us of the existence of such disease, from its very commencement, it more frequently occurs, that attention is not attracted to the liver until disorganization has far advanced; indeed, until the disease is on the point of a fatal termination. This, however, is no more than we often observe in cases of disorganization of this viscus, arising from other causes.* The period at which a disease of the liver, consequent on injury of the head, would be likely of itself to cause death, is

* POUTEAU, *Loc. Cit.* p. 122—3. When speaking of abscess of the liver, produced by injury of the head, remarks, “ La formation de ces abcès ne s’annonce souvent par aucun symptôme fâcheux, et lorsqu’on a quelque raison pour en soupçonner l’existence, il n’est plus temps d’y remédier.”—PORTAL, *L. C.* observes, “ Quelquefois on a découvert par l’ouverture des corps, de grandes suppurations dans cet organe, dont l’existence, n’avait pas même été soupçonnée c’est ce qui est arrivée après des contusions à la tête, cette partie ayant cependant été reconnue dans l’état naturel,” p. 595.

subject to much variety. On some occasions, a fatal termination has taken place in a few days after the receipt of the injury; and, in others, not till after some months.

Authors have not been idle in forming theories to account for the power of external injury to produce disease in distant internal parts. There is, however, one general objection to every hypothesis which has been formed on this subject: they are all built on too partial a view. There are none of them capable of explaining all, or even a majority, of the cases of the kind which occur; and, as it is probable that all such cases depend on the same law of the economy, it is nearly certain that none of the theories, invented for their explanation, are founded in nature.*

* RIOLAN supposed, that, when suppuration of the liver followed an injury of the head, the pus had flowed from the brain to the abdominal organs by the descending cava. PORTAL, POUTEAU, and BERTRANDI, particularly the two last, were of opinion, that suppuration of the liver, consequent on injury of the head, depended on the accumulation of blood in the biliary organ; but they explained the mechanism of this accumulation in different ways. BERTRANDI conceived, that, owing to the injury received, there was a preternatural determination of blood to the brain, and consequently to the internal jugular vein, and thereby to the descending cava; and that the greater column of blood than usual in the latter, obstructed the flow of blood in the ascending cava and hepatic veins, and thus produced the stagnation in the liver. BERTRANDI was, therefore, of opinion, that the sanguineous accumulation was in the venæ cavæ hepaticæ. The hypothesis of POUTEAU supposes a state of circulation, in some

Are not these occurrences to be explained in the very same way, in which we account for the reciprocal influence of all the organs on each other? For example, are not those diseases of the liver, which succeed injuries of the head, produced in the same manner as abscesses around the anus or in the testicle, in consequence of a morbid state of the lungs?

Although I have been insensibly led to make the preceding observations on the important sub-

pects, the very reverse of that described by BERTRANDI. In the opinion of POUTEAU, the circulation through the brain is obstructed, in consequence of the injury received. The blood, therefore, passes in a preternatural quantity by the descending aorta to all the lower parts of the body; but more particularly to the liver, for this organ is not only supplied by an artery, which carries the blood directly from the aorta, but also by a vein, which conveys blood from the abdominal viscera, to the vena porta, in greater abundance than natural, because the viscera receive an unusual quantity by their arteries. Hence, according to POUTEAU, the sanguineous accumulation is in the branches of the hepatic artery, and in those of the vena porta. RICHERAND asserts, that in all cases of disease of the liver, consequent on external injury, this organ has itself received more or less direct violence, although this violence may have escaped observation at the time. LARRAY is of opinion, that, in these cases, the head influences the liver by sympathy. The latest hypothesis, which I have met with, relative to this subject, is that of Mr. CHARLES BELL. He conceives, that some one of our organs may be naturally weak; and that, if this be the case, as soon as the general system is excited by any cause, the weak organ suffers. Pulmonic affections are frequent after amputations, and their occurrence has been explained by the supposition of an inordinate determination of blood to the chest, in consequence of there being, after the removal of a limb, a preternatural quantity of this fluid in the system. Mr. BELL has properly refuted this opinion in his work already alluded to.

ject of internal partial disease, consequent on external injury, I do not intend to offer any remarks on the prevention or treatment of such affections in general. I merely wish to relate a case of hepatic disease, consequent on injury of the head, which I have treated successfully by the remedy that forms the subject of this paper.

CASE H.

MR. T., of Grafton-street, a gentleman of a tall and slender figure, and of a nervous temperament, aged between thirty and forty, was thrown from his gig, in consequence of his horse starting, while he was driving at a very quick pace. He was pitched on his head, and so much stunned, that he remained senseless for some minutes. At the same time, he received a slight scrape on the side of his face, and the skin was rubbed off his right elbow. His hat, which had remained on his head during the fall, so defended the scalp, that it was not wounded. In the course of four or five days, he appeared perfectly recovered, with the exception of an uneasy feeling in his left shoulder, as if it had been bruised; which, however, went off in a few days more. Before a month had expired, he began to complain of a dull, heavy, uneasiness in his right side, extending backwards through the corres-

ponding scapula to the right shoulder. In a short time, his general health became affected; he appeared and felt languid and inactive; his bowels, which had been habitually regular, became constipated; his alvine discharges whitish, and his urine very dark, and frequently turbid; his skin assumed a jaundiced hue; and he began evidently to lose flesh. Such was his state, when he applied to a highly respectable practitioner, who ordered a pitch plaister to his side, and some pills, which had the effect of regulating his bowels. In the course of a very short time, in place of receiving benefit from the remedies ordered, he found himself in a much worse state. He had become much thinner; his skin so yellow, that he appeared to labour under jaundice; and he felt so unlikely to be benefited by the system of treatment, to which he was subjected, that he applied to another practitioner. He was then told, that his liver was diseased, that it was enlarged, and that the only prospect of relief was in a regular course of mercury. To this he was, therefore, submitted. He used principally small doses of the blue pill; and frictions, with camphorated mercurial ointment, over the region of the liver. This treatment appeared, for some time, to benefit him very considerably. His feelings, which had been of the most uncomfortable kind, were much relieved; and he had

strong hopes of a rapid convalescence. It was destined, however, that these hopes were not to be of long duration. The mercurial treatment injured his bowels; a distressing diarrhœa, or rather dysentary came on, which could not be subdued for many days; and, when it was stopped, he found himself exceedingly reduced, and harassed even more than he had been by his former complaints. Mercury, in conjunction with other remedies, (of what nature I could not ascertain,) was, after some time, again tried; but, in consequence of the irritable state of his bowels, it was, from necessity, abandoned.

When I first saw him, which was in July, 1821, five months after the accident, he appeared to be in a very hopeless condition. He was greatly emaciated,—his liver enlarged,—skin very yellow,—no appetite,—great irritability of his bowels,—urine clear, and rather light-coloured,—pulse frequent, but feeble,—very restless nights, during which he was much distressed by extreme heat in the palms of his hands, and soles of his feet, and also by a very troublesome cough, without expectoration.

I immediately determined on putting him, as soon as possible, under the influence of chlorine. This I would probably have done, even if he had not in vain tried the action of mercury. The chlo-

rine was employed, both generally and locally, without intermission, for three weeks. Its general application was made in conjunction with aqueous vapour; but, topically, it was used in the dry state. During the entire of the first, and part of the second week of the treatment, he was so weak that he seldom remained more than twenty minutes in the apparatus, and he could not bear its temperature higher than 100, Ft. After this period, I began to increase gradually both the temperature and the length of time during which he continued exposed to the action of the remedy; and, before the first fortnight had passed, he was so much recovered, and had become so accustomed to the treatment, that he remained in the apparatus for nearly forty minutes each time, at the temperature of 115, Ft.

On the second day of treatment, there was very considerable topical irritation produced, and this was steadily kept up for the first three weeks. The constitutional influence of the chlorine was remarkable about the sixth day after he began its employment. His mouth was made very sore, and the mucous membrane ulcerated in many points. The ulcers were not larger than millet seeds, and were extremely superficial. There were no other means than the chlorine used, (laxatives excepted,) during the treatment.

The gradual and steadily progressive amendment, which took place in this case, afforded me the most heartfelt pleasure. I have mentioned, that, during the first week, he was not able to remain in the apparatus the usual time, or to bear it at the usual temperature. Indeed he was so much reduced in strength, and so ill able for the necessary exertion, that I was, on the third day of the treatment, much disposed to order its discontinuance. It was, however, fortunately persevered in; and, before the first fortnight had passed, there was an evident amendment. From this time, he regained health and strength with astonishing rapidity. His nights became less restless,—his appetite returned,—his bowels ceased to be irritable,—his skin assumed its natural aspect, and lost a remarkably dry and harsh feel, which it at first had. He was under my care for nearly ten weeks. During all this time, the action of the chlorine on his system was continued; for, whenever I thought its influence was subsiding, I ordered its repetition. He is now in the full enjoyment of health; and a great enthusiast for the general employment of a remedy which, he says, without doubt saved his life.

I think the foregoing case will be considered interesting, as well on account of its affording an additional instance to those already related of the

valuable agency of chlorine in hepatic diseases, as of its being an example of a case of disease of the liver, arising from injury of the head, and terminating favourably. I must, however, observe, that there may be some who will think that the disease which existed in the liver, if it was at all produced by the patient being thrown from his gig, owed its origin to direct injury, and not to the shock which the brain had received. I shall, on this subject, merely remark, that, from a close examination of all the circumstances of the case, I formed a very different opinion.

THAT disorder of several internal organs can excite rheumatism in external parts, no one will, I believe, deny. It has also been well known, from the earliest times, that this disease, when it does occur in its usual seat, sometimes produces, by metastasis or retrocession, internal disorder. For some years past, the translation of rheumatism from external parts to the heart, or the occurrence of disease in the heart, on the cessation of rheumatism, has obtained a large share of attention;* and that disorders of the heart, con-

* See the Cases recorded by SIR DAVID DUNDAS, DR. BAILIE, DR. WELLS, MR. CROWFOOT, DR. PEMBERTON, DR. MARCET, MR. RUSSEL, MR. PANKIVIL, DR. O'DIER, DR. MATTHEY, &c.

nected with rheumatic and gouty affections, are of frequent occurrence, there is now no longer room to doubt; but it is also certain, that this organ is not the only one, which can be influenced by the retrocession of these diseases.* The venerable and learned PORTAL, in his elaborate work, so often referred to in the preceding pages, observes, “*Le foie est peut-être de tous les viscères celui qui est le plus fréquemment atteint par la goutte et par le rhumatisme;*” † and the following case will, perhaps, be considered as an example of a morbid state of the liver consequent to rheumatic disease, and probably caused by it.

CASE I.

A GENTLEMAN, aged about forty, consulted me in the spring of 1821. He then complained of great uneasiness in the right hypochondrium; and, although there was no pain on pressing in that region, very considerable distress was caused by even the slightest pressure in the epigastrium.

* In the Works of MORGAGNI, HALLER, LIEUTAUD, and particularly of PORTAL, there are innumerable examples of affections of the brain, lungs, spleen, kidneys, liver, &c., the consequence of gout and rheumatism.

† L. C. page 409, see also BAILLOU, “*Au Rheumatismus et Arthritis Congeneres*, Paris, 1710.” Rheumatism and gout were confounded, until the publication of this work.

He could not lean forward, without increasing the uneasiness in the right side, and, at the same time; producing pain in the region of the corresponding scapula. He was frequently much tormented by an uneasy feeling in his shoulders; which he compared to the sensation that would be caused by carrying on them a heavy weight; and which, he said, was often more difficult to be borne than if it was an acute pain. His digestion was very imperfect; for he was much troubled by flatulence and other dyspeptic symptoms. His mouth, in the morning, was extremely foul; and he could not bear to take food for some hours after rising. His countenance, he said, was naturally a little sallow, and his habit thin; but, when I first saw him, he was yellow and emaciated. His bowels were, for the most part, constipated; but, at times, dysenteric symptoms would occur, which, on subsiding, generally left him better than before the attack.

This gentleman had been, for some years, in Jamaica, where he had suffered much from what is called a *coup-de-soleil*; but it did not appear, that he had ever had there any remarkable disorder of his liver or bowels. On his return to this country, some months before I saw him, he had been attacked by rheumatism, which had come on mildly, but which gradually became very severe,

and was attended by considerable fever. It had commenced in his knees, and afterwards attacked almost every joint in his body, but principally his elbow and shoulders. After these rheumatic affections had continued two or three months, they began to subside; but, in place of finding his health recruited as they disappeared, he became rather more emaciated and sallow, and the symptoms, of which he complained when I first saw him, gradually developed themselves. It appeared to me, that, during the acute stage of the rheumatic attack, he had not been very actively treated; although, from his description, I was led to believe he had been threatened, more than once, with a metastasis of the rheumatic action to his heart.

The system of treatment, which I adopted for the relief of Mr. A., was entirely analogous to that used in the preceding cases; and the result was not less favourable. His bowels were regulated, principally, by the compound colocynth pill; and chlorine, in conjunction with aqueous vapour, was used, both generally and locally, until the constitution was affected, and until considerable local irritation was excited in the region of the liver. The amendment was synchronous with these effects. The constitutional influence of the remedy was observed a few days after I had

commenced the treatment ; and the local irritation was more remarkable than in the majority of cases. From the evident connexion, which I remarked, between the occurrence of this irritation and the relief the patient experienced, I was induced to attribute at least a great part of his cure to its influence. There was considerable ptyalism and soreness of the mouth excited ; but there was no general eruption produced. This gentleman is now in perfect health, which he had not previously enjoyed for many years.

HAVING related some of those cases of disease of the liver, in which I have employed chlorine with the most decidedly good effects, and which I think cannot fail of attracting the serious attention of the profession, I shall proceed to make some general remarks, which I deem necessary, to enable others to use with advantage this valuable agent. As it is impossible to administer a remedy with success for the relief of disease, without an intimate knowledge of its mode of action on the system, before I attempted to ascertain the medical powers of chlorine in morbid states of the constitution, I submitted myself, and, at their desire, some of my pupils, to its influence ; and it is principally from these trials that I have drawn up

the following account of its operation on the body, when in a state of health.

I. ON THE SKIN. If the skin be exposed, in an appropriate apparatus, to the action of chlorine sufficiently diluted with air or aqueous vapour of the temperature of 110, F^t., in the course of ten minutes, sensations will be excited on different parts of the surface, exactly resembling those produced by the stings or bites of very minute insects. At first, these sensations occur only here and there, or on parts remote from each other. For example, stings, indescribably transitory and minute, will be felt at intervals and in succession on the arm, on the back, on the abdomen, or on the lower limbs; and will sometimes, from the manner in which they occur, produce exactly the idea of an insect flying from one part to another, and inflicting a sting at every point which it touches. These sensations gradually increase in number, but not in severity, and at last becoming, from their frequent repetition, rather troublesome, they create an irresistible desire to *slap* with the palm of the hand the parts which are stung, as if we instinctively attempted to kill or catch the insect causing the uneasiness. I have seen some persons so much inclined to this sort of exercise, while exposed to the influence of chlorine, that they have not been able to remain, during the entire operation, a single moment at rest. In

general, although there be a degree of itchiness excited, one feels inclined to avoid scratching, from the fear of injuring the skin, the sensibility of which is greatly increased. It never happens, that the stinging sensations continue troublesome after the person has come out of the apparatus; but they are, in general, succeeded by an increased degree of itchiness combined with a slight smarting, both of which, however, terminate before the patient is dressed. I have, nevertheless, reason to suppose, that the agency of chlorine on the sensibility of the skin is not limited to the period of exposure in the apparatus. The cutaneous organ certainly remains more sensible to impressions for a considerable time after each operation; and patients have frequently observed to me, that, for several hours, after leaving off the employment of chlorine, they have occasionally experienced a pricking sensation, exactly resembling those that they felt while in the apparatus.

Another immediate effect of chlorine, when applied in the manner above mentioned, is an increase of the perspiration. This generally commences about the same time as the stinging sensations just alluded to; and is, for the most part, extremely copious. It may by some be supposed, that the increased action of the cutaneous exhalants is entirely owing to the operation of the heat. That it is in part owing to this cause, I

am very certain : but that it is not altogether dependent on it, I am no less confident ; because the perspiration is always more copious than would be produced by the same degree of heat either alone or combined with aqueous vapour ; and because it is kept up for a much longer time, when excited by chlorine than when it is produced by heat. I have, indeed, often observed, that I was particularly disposed to perspire, during sleep, on the night succeeding a day on which I had been in the apparatus ; and these perspirations were remarkable for being very generally attended by a genial glow over every part of the surface. I am particularly desirous, that the reader may bear this power of chlorine in his recollection ; for to it I am disposed to attribute much of the advantage, which I have experienced from its use in a large proportion of the cases in which I have tried it, and among others in case F., related in the foregoing pages. It is known how very uncertain diaphoretics generally are in their action, and how little they can be depended on : this, however, as far as my experience extends, will not be found to be the case with chlorine.

One of the most remarkable effects of the operation of chlorine on the skin is what may be called the chlorine rash. In every individual, who has been exposed to the influence of this

agent, in the manner already mentioned, there is a most remarkable determination of blood to the surface ; but the rash, to which I allude, does not always occur. It is an eruption of the most minute papulæ, which I have ever observed. They are much more minute than those of either lichen or strophulus,* and occur on all parts of the body, but more particularly on the back, loins, breast, abdomen, and arms. They are generally so very close together, that, if the skin be examined at a little distance, it has a general red appearance ; the intervals between the papulæ not being observable. In short, I cannot give a better idea of the characters of this eruption, than by comparing its aspect to that, which those minute eminences, to which the roughness of the *cutis anserina* is owing, would have, in case of their being minutely injected, or in a state of active inflammation. It is remarkable, that I have often observed a state of the skin, exactly similar in appearance to the *cutis anserina*, in individuals in whom the rash did not appear ; and I have also remarked, that, in others who had the rash, those parts which were not affected by it, were in the rough state just alluded to ; so that perhaps we should be correct if we considered the one an increased degree of the

* See WILLAN'S Treatise on Cutaneous Diseases, or BATEMAN'S Practical Synopsis ; Order I. Gen. 1 and 2.

other. It is important to recollect, that the occurrence of this eruption is always to be considered a beneficial event; for I have uniformly found the action of chlorine most efficient, when it was followed by this rash. It never causes any great uneasiness, and it may be always made to subside by intermitting the employment of the remedy. I have but very rarely observed the papulæ to pass into the state of suppuration or vesication. They sometimes gradually subside, without causing any change in the structure of the skin; but more frequently they terminate by desquamation. I have tried, but as yet without being able to satisfy myself, to ascertain in what particular part of the structure of the skin these papulæ are seated. It is, however, clearly my opinion, that they must be owing either to an enlargement of the papillæ, or to an inflammation of those little packets of cellular substance, which enter into the cutis, through the minute holes observed on its under surface.* Is this eruption owing to the local or constitutional action of chlorine?

The sensations felt by one gentleman, while in the apparatus, were compared by him to those that are caused by the sting of a nettle; and it is

* See "Anatomie Générale, par BICHAT; Paris, 1812. Tome troisième." p. 687.

remarkable, that there was produced in his case a sort of nettle-rash; the wheals being white, small, and in clusters, surrounded by a diffuse redness; in fact, exactly resembling the eruption delineated by DR. WILLAN, as *urticaria febrilis*.

One of my pupils lately exposed himself to the action of chlorine in a more concentrated state, and at a higher temperature (130, Ft.) than that at which it is generally employed. Although he very soon appeared to suffer much from the stinging and smarting sensations, which the chlorine produced, he resolutely continued the experiment. There was, almost immediately, a very copious perspiration excited; and, after he had been in about fifteen minutes, he distinctly felt small eminences, rising on different parts of his surface, which he supposed to be the chlorine rash, although they felt larger than the papulæ of that eruption. I now entreated him to come out, but in vain; for he said, he was determined to continue in the usual time—half an hour. When the operation was over, we were surprized to find almost every part of his skin thickly studded with the most minute vesicles. In many places, particularly on the shoulders, these vesicles were so close to each other, that their bases very nearly touched. The whole eruption, indeed, had very much the character of a miliary rash. When I

observed the vesicles I was a little alarmed, particularly as he complained of considerable weakness and exhaustion, and as his heart acted with very great rapidity, but without much strength. The following day, however, he was perfectly well; all the vesicles had shrunk, and entirely lost a sensation of smarting which had continued troublesome for some hours. The points which had been occupied by these vesicles assumed, on the second day, the appearance of minute red or livid spots, which continued for three weeks. Whether the eruption in this case was owing to the action of chlorine, or of the heat, or of both combined, I cannot at present pretend to say. I have never observed the same kind of rash, either before or since; and have often seen patients exposed to a much higher temperature, without any such effect being produced. It may be proper to mention, that this gentleman had been before submitted to the action of chlorine, (though not at so high a temperature, nor in so concentrated a state,) without any eruption having been excited.

If a limited portion of the skin be exposed to the action of pure chlorine, there is instantly excited in the part a pleasant feeling of warmth; and, in the course of a minute, those stinging sensations, already described, are produced. If the skin be now examined, it will be found to

have its sensibility diminished ; to resemble very much in appearance the *cutis anserina* ; and to be dry, yellow, and shrivelled. The latter effects are owing, I conceive, to the immediate action of chlorine on the inorganic cuticle. If the gas be retained for a longer time in contact with the skin, the stinging sensations cease ; and a feeling is excited exactly resembling in kind (but less in degree) that which attends the application of cantharides. This sensation generally commences about three minutes after exposure to the chlorine ; more or less quickly, however, according to the sensibility of the part and the thickness of the cuticle covering it. At the same time that this last sensation is produced, the skin assumes a red appearance, and if the application of the gas be longer continued, considerable pain is the consequence. Although the gas be now removed the pain continues, the redness increases, the skin becomes tumid and elevated above that which surrounds it ; so that the line of demarcation, between that portion to which the gas was, and that to which it was not applied, is very remarkable. The skin now appears to be thickened and evidently affected throughout its entire structure, resembling very much the aspect which the integuments of the face often assume when attacked by erysipelas. In the course of half an hour, the sensation analogous to that pro-

duced by a blister gradually subsides, and is replaced by soreness, and a feeling as if the part had been contused. These sensations continue for several days, the skin still appearing to be deeply affected; at last they are replaced by itchiness, and the cuticle comes off in thick scales, giving to the part very much the aspect of its being affected by psoriasis; and it is not until two or three weeks after the application of the gas, that the part assumes in every respect its natural appearance. Should the chlorine be kept in contact with the skin longer than the time above mentioned, a degree of inflammation is excited, which necessarily terminates in ulceration in less than four-and-twenty hours after application.

The consequences already described as resulting from the application of chlorine to the skin, appear to be, in general, owing to its influence on the vital properties of this organ. There is, however, sometimes another effect; and it is not easy to determine whether it arises from the chemical action of the chlorine on the inorganic cuticle, or from its influence on the secretory powers of the cutis, by which the cuticle is produced. The effect to which I allude is a state of furfuration or gentle desquamation, which, as well as the papular eruption, denote that the remedy is likely to have a salutary influence on the system.

From what has been said it appears, that the immediate effects which arise from the application of diluted chlorine to the skin are an exaltation of its sensibility and the excitation of peculiar sensations, an increase of its secretions, a preternatural accumulation of blood in its capillaries, and finally an elevation of its natural temperature; from all of which we are authorized to conclude, that its functions and vital properties are brought into a state of excessive preternatural excitement, which continues for a *considerable time after each operation*. Moreover, we find that when this gas is applied in a pure state to the skin, it has the power of *instantly* altering its structure; which alteration may be diminished or increased, may be allowed to subside, or be at pleasure kept up for a longer or shorter time.

II. MUCOUS MEMBRANES. Under this head we may consider the action of chlorine both on the mucous surfaces and on the glands, whose ducts terminate on these surfaces.

It is very remarkable, that the influence of chlorine on the mucous membranes is somewhat analogous to that which it exercises on the skin; although in the latter case it acts directly, and in the former only indirectly. Thus, when a person is under the influence of this agent, there is an

alteration in the quantity and quality of all the secretions which are performed on these membranes, but more particularly of those of the biliary and salivary glands, and of the urinary and genital organs; an increase of their sensibility, testified by a soreness of the mouth, fauces, and œsophagus, which the person expresses by saying, he feels as if his tongue had been burned, as if he had been eating some acrid vegetable, or as if his *teeth* had been injured by an acid; and lastly an alteration of structure, indicated by increased vascularity and minute ulcerations of the mouth and throat. If we consider the very powerful action which chlorine exerts upon the mucous membranes, when directly applied to them, (an action observed by every one who has experimented with this gas,) instead of being surprised that it should have the foregoing effects, we shall only wonder that they are not much more remarkable.

III. RESPIRATION AND CIRCULATION. The frequency of the heart's action and of respiration is certainly much increased during exposure to the influence of chlorine; but, whether these effects be owing to the operation of the heat, which is applied at the same time, I shall not pretend to say. I may mention, however, that I am disposed to believe, that the functions of both respiration and circulation are permanently exhilarated by the

action of chlorine ; for I think I have observed such a state to exist from one application of this agent to the other, and this, whether there was or was not any cutaneous irritation.

IV. BRAIN AND NERVES. Chlorine has the power of tranquillizing, and, at the same time, exciting the nervous system. Whether this be owing to its immediate operation on the brain and nerves, or to its action on these parts through the medium of the liver, I cannot pretend to say. I have seen persons, who have been in a most languid and desponding state, rendered, by one application of chlorine, almost immediately tranquil and active. It should not, however, be concealed from the reader, that, on some very rare occasions, it has appeared to increase the nervous state of patients, and that in consequence I have been obliged to intermit its employment.

Such then are the *sensible* effects, which generally arise from the action of chlorine ; but, it has others, which, if I were permitted the expression, I would call *insensible*. I have seen so many instances of the powers which this agent has of modifying, in a gradual manner, the tone of the organic fibre, that I am very far from limiting its beneficial agency on the constitution to the influence arising from those effects which are

very obvious and striking. I am, indeed, certain that much of its value in chronic disease is owing to an action, which, although most gradual in its operation, finally accomplishes a general and complete change in the organization. I feel, however, that, if I permitted myself, I should be disposed to enter on a discussion which many might conceive could not be supported by obvious phenomena; and, as I wish, as much as possible, to limit myself to the consideration of facts which admit of no doubt, I shall not at present enlarge on this subject.

I have already observed, that all medicines act either by their immediate influence on those parts to which they are directly applied; by the sympathies which they excite in remote organs, in consequence of the changes arising from their direct application; or by being conveyed along with the circulating fluids to internal parts, upon which they have a specific effect. Chlorine acts in all of these ways. Thus its effects on the skin, to which it is directly applied, are most obvious; and that such effects cannot occur, without exciting sympathetic changes in the numerous parts with which this organ intimately sympathizes, our knowledge of the animal economy gives us every reason to suppose. Moreover, we have, in the change which takes place in the qualities of the

various secretions, a convincing proof that chlorine, when applied to the skin, enters the circulation. Thus the urine loses, in a great measure, its power of reddening paper stained by litmus, and acquires the property of discharging more or less completely its natural colour.

Had chlorine no other influence on the system than that which it exercises directly on the skin, we might rationally expect to find in it a most valuable addition to our means of treating disease. An agent which has so completely the power of exciting the cutaneous organ in so general, so permanent, and so salutary a manner, must necessarily afford very considerable assistance in the treatment of those innumerable diseases which either depend on, or are attended by, a languid or atonic state of this important covering. Its powers also as a cutaneous irritant, when applied in a pure state, will be found, in many cases, much superior to that of a blister; owing perhaps to its having the property of affecting the structure of the integuments more deeply, and in a more equable manner, than can be obtained by the application of cantharides. However, although I am disposed to attribute so much of the beneficial effects, which result from the employment of chlorine, to its immediate action on the skin, I am very far from conceiving that the sa-

lutary changes, which it is capable of producing on the economy, are entirely or even principally to be attributed to this cause alone. On the contrary, if the advantages to be derived from its operation be owing to its action on one part or function rather than on another, I would say that that function was the important one of secretion. Indeed, that chlorine has a most powerful influence in modifying not only the secretion of bile, but all the acts of secretion, (taking this word in its most extensive signification,) there cannot be a shadow of doubt; and the great value of an agent in the treatment of disease, which has such powers, must appear evident when the remarkable influence of the secretory functions in causing, modifying, or removing diseased action, be carefully considered.

If then the agency of chlorine be so extensive, it must be clear to all, who are acquainted with the general principles by which morbid actions are subdued, that hepatic diseases are very far from being the only affections, for the relief of which this remedy may be beneficially employed. Nor is the reader to suppose, because I have limited my views in this publication to its influence in diseased states of the liver, that in these alone I have used it. To this limitation I have been prompted, partly for the sake of greater accuracy,

and partly because the remedy in question possesses most remarkable powers in affections of the biliary system. Moreover, for reasons which are obvious, I first employed it in morbid states of the liver, and consequently my experience of its utility is more accurate and extensive in these than in any others.

Were it required that I should, in a general way, communicate my opinion respecting the diseases, besides those of the liver, in which I should expect, from my knowledge of the mode of action of chlorine, that it might be usefully employed, I would answer, that it deserves a trial in all cachectic states of the system ; and in every disease, of whatever kind it may be, which we might rationally hope to benefit, by stimulating or restoring the functions of the skin, or by keeping up, in this important covering, a state of permanent irritation. As examples of the former class, I may mention scrofula and lues,* and of the latter many chronic inflammations of the fibrous and mucous tissues, such as rheumatism, catarrh, &c. &c. I admit that these remarks are

* See " Report on the use of the Nitro-muriatic Acid Bath, in certain obscure Cases of Syphilis," by Mr. C. BELL, in his " Surgical Observations. Part III. London, 1817." p. 538 ; and " A Treatise on the Medical Powers of the Nitro-muriatic Acid Bath in various Diseases, by WALTER DUNLOP. London, 1820."

very indefinite. They will, however, be easily understood by those who are acquainted with the principles of treating disease; and it would not be possible for me to deviate so far from the particular object of this publication, as to lay down rules on this subject suited to the routine practitioner.

What, it may be asked, is the immediate source of the remarkably beneficial influence of chlorine in hepatic diseases in particular? Although this has been in some measure discussed in the observations already made on each case, it may be useful to add here a few reflections on the subject.

When we consider the intimate connexion which exists between the liver and skin, (a connexion proved by many phenomena of daily occurrence,) we necessarily come to the conclusion, that the diseases of the one must have a powerful influence on the state of the other. I have already made some remarks on the power which morbid states of the liver have of causing *organic* cutaneous disease, and it will be admitted by every one who has studied with care the symptoms of hepatic disorder, that there always is, on such occasions, more or less derangement in the *functions* of the skin. A remedy, therefore, which

tends, in a powerful manner, to restore this organ to a state of health, must influence most beneficially every case of biliary disease.

There are numerous facts, which clearly prove, that many of the causes of hepatic derangements act by means of the influence which they exercise on the *functions* of the skin. It is, for instance, in this way alone, that we can explain satisfactorily the share which particular states of the atmosphere have in the production of diseases of the liver.* If then certain impressions made on the cutaneous organ can excite hepatic disease, we may fairly conclude that other or opposite impressions may have a contrary effect. Hence, it is extremely probable that a second mode, by which chlorine acts beneficially in affections of the liver, is by inducing such a state of the *functions* of the skin as may, by the sympathetic influence which this organ exercises on the liver, contribute more or less to the removal of its disease. Although we cannot deny the power which certain impressions made on the skin have of causing hepatic derangement, we must admit our ignorance of the manner in which these impressions produce their effect. Therefore, even if I should be unable to explain the

* See JOHNSON, L. C. p. 7, &c.

mode in which chlorine exercises this salutary sympathetic influence on the liver by its operation on the skin, I am not to be denied the truth of my assertion. I feel that I might discuss the subject in a plausible manner, yet, as I am confident, that in the present state of physiology there would be much to object to any explanation which might be proposed, I content myself with the support which I have shewn to be derived from analogy.

I have already had occasion to allude to the benefit obtained from the local irritation excited by chlorine. I have also asserted its superiority as a cutaneous irritant, and that this probably depends on the powers which it has of deeply affecting the texture of the cutaneous organ. In proof of this latter opinion, I shall in this place take the opportunity of mentioning, that the greater efficacy of moxa, caustics, setons, &c., than of blisters, in the treatment of surgical diseases is probably owing to their altering to a great depth the structure of the integuments, rather than to the drain or suppuration which they excite; for I have frequently observed that, in cases where a blister was used for the purpose of creating and keeping up a cutaneous suppuration, its beneficial effects were but trifling, (no matter how great the

discharge,) until, by the continuance of the suppurative action, the structure of the skin became deeply affected. Why is permanent cutaneous irritation or suppuration so seldom employed by the physician? As far as my experience goes, this is much to be regretted; for I have found it equally beneficial in the treatment of internal and external disease.

From what has been said, it would appear that the direct or immediate effects which chlorine produces on the skin, would of themselves be sufficient to account for the beneficial operation of this agent in hepatic diseases. But, while we admit the value of these effects, we are not to forget the still more important ones, which may result from the absorption of the remedy, and its consequent action on the internal organs in general, and on the liver in particular. It may be said that it is impossible to distinguish what proportion of the benefit obtained is assignable to each of the sources alluded to: I admit that this is the case; but I do not think that its determination is of much importance. I have proved by the preceding remarks, that there is no difficulty in the way of accounting for the beneficial agency of chlorine in hepatic diseases, and this is all that I deem necessary.

It may be inquired, is chlorine a remedy

adapted to all morbid states of the liver? To such a question I would answer, that it will be found useful, more or less, in every derangement of the biliary system; that, in some it can be considered an adjuvant only, and must be used with caution; but that, in others, it will be of itself sufficient to accomplish a cure, even when all the other resources of medicine have failed. This is a bold assertion; yet I make it with confidence, because I know that it is founded on the basis of experience. Although the cases which I have related will serve, in a great measure, to point out to the reader the kinds of hepatic disease to which it will be found more particularly applicable, I shall here add some remarks on this subject, which may not be useless.

To communicate, in a single sentence, a rule for the regulation of our conduct respecting the employment of chlorine in diseases of the liver, I may remark, that, *in all cases of hepatic disease, which consist in a torpid or wrong action of the secretory powers of the biliary organ, but which are not attended by active inflammation, it will be found an invaluable remedy, and may be boldly used with well grounded expectations of success.* It is scarcely necessary to make any remarks on the frequency of such states of the liver, and on the numerous anomalous symptoms to which they give rise.

Who is unacquainted with the powerful influence of the liver on the nervous system? or who is ignorant of the miserably distressing states of the mind, which frequently arise from hepatic disease, in consequence of this influence? Of all the sympathetic effects, which spring from derangements of the biliary organs, I know of none that are frequently more perplexing; nor is there any class of patients more to be pitied, than such as are called nervous and hypochondriacal. Their inward distress is extreme, and yet they seldom excite sympathy in those that surround them. How many patients have I seen, whose life was miserable from such causes, and who would have most gladly exchanged it for death, were not the resources of religion present for their relief and consolation. It is, indeed, a miserable sight to remark the melancholy, the irritability, the despondency, the languor, in short the almost total incapability of dragging on existence, which is frequently observed in such patients, although to a spectator they scarcely appear deficient in health, or to want any of the ordinary sources of worldly enjoyment. This picture is not overcharged. The distress often exceeds it, and not unfrequently leads the unfortunate sufferer to commit that crime, which, above all others, excites the most pitiable ideas of the weakness of human nature, or induces such a state of men-

tal imbecility and discontent with the world, as renders him a burthen to himself and his friends. For the relief of those hepatic diseases, which give origin to such symptoms, there is not, within my experience, any remedy to be compared to chlorine. It too frequently happens, that, when we attempt to relieve affections, such as I have just described, by the remedies in general use, they have the effect of increasing, at least for a time, the nervous state of the patient; and often produce a degree of exhaustion so intolerable, that it is with difficulty we can persevere in their employment. Besides, it must be admitted, that the relief derived from their administration, is in general only temporary; and consequently their repetition becomes necessary, thereby rendering the unpleasant feelings excited by their operation still more serious. Such objections do not exist with respect to the remedy whose powers I am advocating. It seldom or ever, even for a time, increases that exhaustion or nervousness, which it is applied to relieve; and, although its repetition may be necessary, its beneficial influence lasts much longer than that which results from the administration of any other means of relief: probably for the very reason that its operation does not produce that debility of the system, of which the exhaustion, that attends on other remedies, is to be considered a

sign. Indeed, chlorine is, in general, so far from producing either exhaustion or an increase of nervous irritability, during its operation, that it will often have the most remarkable effects in tranquillizing the mind, and in giving energy and activity to the feelings. I have seen the state of hypochondriacal and nervous patients sometimes so immediately relieved by its operation, that its influence could only be compared to the temporary exhilarating effects of a narcotic.

The influence of a torpid state of the liver is not less remarkable on the vascular, than I have described it to be on the nervous system. I have already alluded to the sympathetic derangements of the action of the heart, testified principally by palpitations and sinking sensations in the region of that organ, which frequently arise from hepatic disease. I have also related a remarkable case of this kind.* Some others of a similar nature have occurred, and the results were generally such as I could have wished. In this place, however, it is to those derangements of the vascular system, which give rise to preternatural determinations of blood to particular parts, that I wish especially to allude. The number of diseases, which appear to spring from this

* See Case E.

source, are remarkably great. I am not, indeed, certain, whether it may not be the cause of those nervous symptoms, to which I have above alluded. Such, in fact, is the opinion supported by Dr. PARRY in his valuable work on Pathology: a work, which does the greatest honour to its author, and must soon obtain that general attention of which it is so highly deserving. There are many diseases attended by a preternatural accumulation of blood in the head, and a deficient or languid circulation in the lower parts of the body, which appear to me to be greatly influenced by a torpid state of the liver, if not remotely owing to it. Such are, some kinds of headaches, flushings of the face, coldness of the lower extremities, torpidity of the bowels, deficient or suppressed menstruation, and probably hysteria, chlorosis, chorea, epilepsia: diseases which are often most intractable in their nature. Let me however observe, that, whether or not these affections positively depend on an imperfect secretion of bile or torpid action of the liver, no one can deny that they are attended by such a state of this organ; and that great advantage is always obtained by stimulating it to a more natural and active secretion. Therefore, that chlorine would be likely to exercise a beneficial influence in such cases is only what we might expect from the consideration of

the nature of its powers on the system; and, from the benefit which I have obtained from it in some cases of this kind, I am inclined to think, that it will be found more or less serviceable in them all. But I should here remark that it is very probable the beneficial influence of chlorine in diseases, which depend on irregularities in the circulation of the blood, is not altogether owing to its action on the liver; but to a power, which it (in common with every remedy that is capable of exciting the functions of the skin,) must have of equalising the circulation of the blood.

If individual organs of different apparatuses be closely connected by sympathy, the union is still more remarkable between the different organs of the same apparatus. How close is the sympathy between all those organs that are engaged in the important function of digestion! Of these the liver and stomach hold the first rank: they constitute, as it were, the centre of the digestive apparatus; consequently their mutual sympathies, although of the closest kind, do not surprise us. Their connexion is, indeed, so remarkable, that the one is perhaps never disordered without a corresponding disorder of the other; and it is often, (as we find to be the case on all such occasions,) extremely difficult to say in which

the disease commenced. But, whether the affection has been originally one of the stomach or of the liver, there can be no doubt of the propriety of doing every thing in our power to restore the latter to its healthy state. The relation of the liver to the intestinal canal is scarcely less intimate than that which it has with the stomach. Many indeed suppose that it is more intimate. It is in consequence of this connexion, that a torpid state of the liver causes a similar state of the bowels, and all that train of distressing symptoms, which exist in that extensive class of diseases, commonly called bilious, and which most frequently owe their origin to imperfect chylification, or tardy discharge of the residue of digestion. Therefore it is, that I have tried the employment of chlorine in many cases of complicated disorder of the abdominal viscera, and I have several times had reason to congratulate myself on the result.

The disorder of the biliary organ, which gives origin to the diseases of the nervous and vascular systems, and of the apparatus of digestion, to which I have just alluded, is, for the most part, merely functional, and, in general, of a chronic kind. It is, indeed, exactly such as is most likely to be benefited by this new remedy ; for it consists in a torpid or wrong action of the secretory powers

of the liver, unattended by active inflammation. The cases, however, which I have related clearly prove, that it is not merely in functional diseases of the liver, but also on many occasions, when the structure of this organ is more or less affected, that we may rationally hope for advantage from its employment. It must, nevertheless, be admitted, as might indeed be expected, that the latter are the states, which are least likely to be benefited. Yet, although I have often failed in being able to render relief, the results have sometimes far exceeded my expectations; and, in all such cases, as other remedies so commonly fail of affording relief, it is worthy of a trial, for "if it does no good it can do no harm." At the same time, I do not wish it to be supposed, that it is a remedy which may be trifled with. Its administration will always require the superintendance of a practitioner, who will know how to adapt his conduct to the exigencies of each case, so as to continue, interrupt, or modify its employment, as circumstances may render necessary.

Although, from the property which chlorine appears to possess of stimulating the vascular system, it cannot be used without caution in cases of acute hepatitis, I am nevertheless disposed to believe, that, even in these, it will be found a most useful adjuvant, as well by its determining

to the surface, as by its exciting the secretory powers of the liver, which are generally on such occasions in a state more or less inactive. It is unnecessary to observe on the important relief, which is always afforded, in cases of glandular inflammation, by exciting a discharge of the natural secretion of the organ affected. So true indeed is this, that, probably if we had it always in our power to excite such discharges, we should, for the most part, be able to prevent that disorganization of these important parts, which so frequently occurs.*

It is necessary to say a few words in this place respecting my mode of applying to the skin *gaseous* chlorine, and of the manner in which I procure this agent. Chlorine may be used in a pure or in a diluted state. When it is used in the latter form, it may be diluted by atmospheric air alone, or by this and aqueous vapour; and it may be applied either generally or partially, and at various temperatures. But, when it is used in what may be called a pure state, it can be applied only partially.

* See "Observations on the Internal and External Use of the Nitro-muriatic Acid in the Cure of Diseases, by H. Scott, M. D," in "Med. Chir. Transac. Vol. VIII. Part. 1. London 1817." p. 185. See also DR. JOHNSON'S Work already often referred to, p. 111.

For the administration, both partial and general, of diluted chlorine, I used for a long time RAPOU'S instrument for *douches*, and the fumigating apparatus constructed by my directions at the Dublin Skin Infirmary. These I found to answer on the whole very well; but latterly I have employed a new set of instruments, which possess peculiar advantages for the application, both general and partial, not merely of chlorine, but of all vapours and gaseous bodies. This new apparatus is portable, and may be placed in any apartment in which there is the funnel of a chimney, without any trouble or alteration whatever. In an hospital, therefore, it can be carried from one ward to another, as may be necessary for the accommodation of the different patients who may require it; and it not only possesses all the advantages of an immoveable apparatus, but, in some respects, its construction is very far superior. It was my intention to have given, in this publication, a description of this new apparatus, in conjunction with an account of some other instruments of an analogous kind, which I am in the habit of using at the Skin Infirmary. In this intention I am for the present disappointed, in consequence of not having been able to get engravings executed in time; and I feel that any description, which I could give, would not be intelligible without them. I shall, however, take a very early

opportunity of publishing a full account of these apparatuses; for I feel convinced, that, by the improvements which I have made, particularly in simplifying their construction and in rendering them portable, I have removed every difficulty which opposed their introduction into general practice.* In the mean time the apparatuses which I originally used, and a description of which, with engravings, is before the profession, will answer sufficiently well, *if they be properly constructed.* †

A very simple instrument, for the partial application of pure chlorine, may be made in the following manner. Procure cupping-glasses of the ordinary form and size, and attach to each a screw, by means of which a stop-cock may be connected with any of them at pleasure. One of these cupping-glasses, of whatever size may be necessary, is to be applied to the part in which we may wish to excite the specific irritation of chlorine, and its air exhausted by any of the

* It would appear, from the reviews which I have seen of ASSALINI'S work on fumigation, that he also has been labouring to render these instruments portable.

† See "Essai sur L'Atmidiatrique ou Médecine par les Vapeurs, par T. RAPOU. Paris et Lyon, 1819;"—and "Observations on Sulphureous Fumigations, by W. WALLACE, M. R. I. A. &c., Dublin, 1820."

means ordinarily used for that purpose. Having previously prepared the chlorine, it is to be introduced through the stop-cock, while an assistant holds the glass to prevent its falling off in consequence of the vacuum, which was the cause of its adhesion to the part, being removed by the ingress of the chlorine. The chlorine may be passed into the cupping-glass in one of two ways, viz., it may be injected by means of a syringe, which had been charged with this gas from a receiving jar containing it, and placed over warm water; or, having previously condensed a quantity of chlorine into a phial furnished with a stop-cock adapted to the stop-cock of the cupping-glass, by establishing a communication between the cupping-glass and the phial, the condensed chlorine, contained in the latter, will immediately rush into the vacuum that had been created in the former. The chlorine may then be retained for a longer or shorter time (seldom more than five minutes will be required) in contact with the skin; and, if it be considered necessary to remove the gas, (before the cupping-glass be taken off,) for the purpose of preventing its escape into the apartment, this can easily be done by means of the syringe. I need not tell those who are acquainted with the rapidity with which chlorine acts on brass, that syringes made of that

metal are not well calculated for the purposes of this operation. However, as the chlorine remains so short a time in contact with them, they will answer on the whole very well. This operation requires a degree of address; but, with a little experience, it is very easily performed, and the advantages, which result from it, will amply repay the operator.

The following is the manner in which I procure the gas. I keep always ready prepared a mixture of muriate of soda and of the black oxyde of manganese, well triturated together, in the proportion of three parts of the former and one of the latter; and also a quantity of sulphuric acid, whose specific gravity is to that of water as 1400 is to 1000. By mixing four parts of the compound powder with three parts of the acid, and applying a gentle heat, the gas is quickly brought over, and may be then used, according as it is required for general or partial application. I keep the manganese and muriate of soda ready mixed for greater convenience; and I prefer an acid, diluted as I have mentioned, to that of the strength of either the London or Dublin pharmacopœias, for the purpose of preventing the mixture from boiling over, which often happens, when the acid is used in too concentrated a state.

It is nearly impossible to say what quantity of chlorine may be required for each general fumigation. Great variety will, indeed, be caused by the temperature at which it is used, by the more or less perfect construction of the apparatus, by the sensibility of the patient's skin, and according as the chlorine be diluted with atmospheric air alone, or by this and aqueous vapour. It should always be in such quantity as to excite the peculiar sensations, which arise from its employment. These sensations will afford the best rule for the regulation of our conduct; and it will be found, that very different quantities of chlorine will be necessary to produce them, arising from the circumstances above mentioned. Thus, the higher the temperature, the less gas is required; and, if it be diluted with aqueous vapour, it will produce its specific effects more easily than if administered in a dry state. Some patients will require a quantity inconceivably small, and there are others, in whom, owing to the remarkable atony of their skin, we cannot produce any effect without its being used in a state of great concentration. It is scarcely necessary to remark, that if the apparatus be not perfectly constructed, there will be a great loss of the material. Indeed, with a bad apparatus, it cannot be applied in a state of sufficient concentration,

without its escaping into the apartment, and instantly producing such distress of respiration, as renders it impossible to continue the operation. Let me here impress the reader with the absolute necessity of his possessing a perfect apparatus to enable him to give the remedy a fair trial ; for, unless it be perfect, he will not only be unable to benefit his patient, but he will also run the risk of causing great distress, or of even committing very serious mischief. When the apparatus is perfect, the minutest portion of chlorine cannot escape. If, therefore, the patient feels the smell of the gas in the apartment, he may be certain that the instrument is not properly constructed ; and that, although he may escape injury from the operation, he cannot possibly be benefited by it.

There is as great variety in respect to the length of time that the patient should remain in the apparatus, and the temperature at which it should be used, as there is in respect to the quantity of chlorine required. It is, therefore, equally impossible to lay down any very accurate rule respecting them. I have always consulted the patient's feelings ; and have found that, while some would not wish to remain in the apparatus longer than fifteen or twenty minutes,

others have not felt inclined to come out for nearly an hour. Again, a temperature of 98,Ft., will be sufficient for many; but, for others, I have found it necessary to raise the heat of the apparatus to upwards of 120,Ft. On the whole, half an hour may be considered a proper time for the greater number of patients; and the temperature, which will in general answer best, is about 115,Ft.

When it is considered necessary to conjoin with the general application of chlorine, the partial application of this gas in a diluted state, (and this will in general be the case,) it should be done while the patient sits surrounded by the chlorine in the apparatus. Many advantages will be found to arise from adopting this plan. Thus the patient will run no risk of catching cold from exposure, and the diluted chlorine will be prevented from escaping into the apartment. I need scarcely mention, that there is no difficulty in adopting such a practice. It is merely necessary for this purpose to convey the tube of RAPOU'S instrument into an appropriate part of the apparatus, and the patient can himself direct the stream of chlorine on whatever spot is required, merely by regulating the direction of the tube. When it is necessary to apply pure chlorine, it of course

must be done at another time than that during which the patient is enclosed in the apparatus.

I have observed, in another place, that I studiously made the treatment of the cases as simple as possible, with the view of enabling me to ascertain more correctly the influence of the remedy; but it should, nevertheless, be here remarked, that they are often related in such a way, as may lead the reader to suppose their treatment was more simple than that which was in reality adopted. Those who know the all-powerful influence which air, exercise, food, and the regular discharge of the excretions of the alimentary canal, have on the system, and the absolute necessity that there is, in all cases, to attend most particularly to these circumstances, whatever may be the treatment we adopt, will of course be well aware, that I made the strictest attention to them a matter of paramount importance. To be brief on this subject, I shall mention, that I have been long in the habit of regulating my conduct, respecting the foregoing circumstances, by the principles laid down by Mr. ABERNETHY, in his invaluable Inquiry into the Constitutional Origin and Treatment of Local Diseases.

The reader may no doubt be surprised, when

he is informed, that the employment of laxatives or purgatives must, in general, be combined with the treatment by chlorine; as this agent is represented to have a direct influence in increasing the biliary secretion, which is generally supposed to be a natural purgative to the alimentary canal. I shall not here enter into any inquiry on the subject of the purgative qualities of the bile. I shall merely assert, that, although an increased flow of bile into the intestines is an immediate and almost constant effect of the influence of chlorine, yet this will often not be followed by purgation. If it be asked, how can this be the case? I cannot give a satisfactory answer, so long as it is asserted, that accumulated bile *must* produce purgation;* but, in case it should be asked, what proof is there of an increased flow of bile? I answer, the extreme bilious character of the fœces. They are often coloured, as if they were composed almost entirely of the most concentrated biliary matter, and this whether they be solid or fluid. Let me then again

* There are circumstances which are well known to have the effect of causing an increase of the secretion of bile, yet, under these very circumstances, the bowels are often remarkably torpid. Thus atmospheric heat has certainly the effect of stimulating the liver to increased secretion, and it also, at the same time, often produces constipation of the bowels.

repeat, that the practitioner must be most careful not to expect that the bile, accumulated in the intestine, will necessarily accomplish its own evacuation, for the contrary will, for the most part, be found to be the case; and, if the alimentary canal be not stimulated, from time to time, by the operation of purgatives, serious inconveniences will arise, such as headach, diminished appetite, heat of surface, particularly of the palms of the hands and soles of the feet, restless nights, &c. &c.

Should it be conceived, that I ought to have discussed much more fully than I have done the medical treatment of the patient before he is submitted to this remedy, during its employment, and after it has been left off, my answer is, that I do not conceive such details at all necessary. I have made the reader acquainted, as well as I could, with the action of the remedy. I have, therefore, given him *principles* for its employment; and this must be, to the scientific practitioner, far more useful and more acceptable than any other kind of information, which I could have communicated. Principles will enable him to regulate his conduct, will teach him when the remedy may be used with propriety, how long it should be continued, when it ought to be left off, what system of treatment should pre-

cede its administration, how the patient should be managed while under its influence, and what plan should be adopted, after it is left off, for the purpose of securing any amendment that may have been obtained. There are, however, several particulars respecting the management of the patient, and the mode of using the apparatus, which may be learned by referring to the cases related in the preceding pages, and to my "Observations on Sulphureous Fumigations."

I have already mentioned that it was, in consequence of believing chlorine to be the active medical agent in that heterogeneous mixture called nitro-muriatic acid, that I was led to employ it in the manner recommended in this essay.* The results of my investigations have fully convinced me of the correctness of those views; for the effects which arise from the application to the skin of chlorine gas, when sufficiently diluted, if assisted in its operation by an artificial heat, are exactly the same as those which the nitro-mu-

* If nitric and muriatic acids be mixed, a mutual decomposition takes place, of which water, chlorine, and nitrous acid are the results. This constitutes what has been called *nitro-muriatic acid*, the *aqua regia* of the older chemists. See "Journal of Science and the Arts, No. 2." or Dr. PARIS's "Pharmacologia," p. 228.

riatic acid is capable of *sometimes* producing. Indeed, the only difference that I have observed, consists in the *certainty* with which gaseous chlorine acts, compared with the very *uncertain* effects which arise from the nitro-muriatic acid.* It is a remarkable circumstance, and one the rea-

* I shall here take the liberty of extracting, from the publications of Drs. SCOTT and JOHNSON, and from that of Mr. C. BELL, their descriptions of the effects of the nitro-muriatic acid bath, for the information of those who may not have an opportunity of consulting the works themselves, and to enable the reader to compare its effects with those which I have obtained by chlorine fumigations.

“ When the bathing or sponging is carried to a considerable extent, and when the system is much under its influence, a sense of weakness comes on occasionally ; some nervous irritation and restlessness are felt ; a taste of metal (generally compared to that of copper) becomes sensible ; and a sense of pain occurs in some part of the palate or mouth, which is not permanent, but comes and soon goes off again. At length little specks or small ulcerations, extending no deeper than the cuticle, are seen on the interior surface of the mouth and over the tongue, so that some degree of excoriation or rawness is at last produced. This is attended by a considerable discharge of saliva, with an increase of the feeling of lowness or depression. These effects resemble those of mercury, but they are not the same. The excoriation from the nitro-muriatic acid never reaches deeper than the cuticle : it never gives rise to fœtid ulcerations of any kind ; nor does it produce the least offensive smell of the breath nor in the mouth. The effects of it in this way are surprisingly fugitive. At one hour the discharge of saliva may be excessive ; the next it will stop, and perhaps suddenly come on again. The excoriations in the mouth generally go away in a day or two, if the remedy be discontinued, and appear no more. While the mouth in this way is affected by the acid, the teeth partake of uneasiness ; but I never saw this in a considerable degree, nor have I known any injury done to the teeth or their sockets. These last mentioned effects are seldom met with to the extent that I have described.”

son of which is not at first very obvious, that a mixture of nitro-muriatic acid and water, used as a bath or embrocation, produces, with greater certainty, the specific effects of chlorine, than pure water saturated with this gas. The cause of this is, however, capable of explanation by the principles laid down in the beginning of this publication. The acid, with which the chlorine is mixed in the

“ In order to get a delicate test for acidity or alcalescency, I have been accustomed to rub the red petals of the *hibiscus rosa sinensis* on white paper, where they leave a blue-coloured stain. I observe, when under the influence of the bath, the urine no longer turns this colour red, but destroys it altogether.”

“ The nitro-muriatic acid appears in a particular manner to affect the glands, and to alter their secretions; and on this power a great part of its value in derangements of the liver seems to depend. It sometimes very suddenly increases the secretion of bile; and this effect may be kept up for a length of time. It increases the perspiration, and often to a great extent.” SCOTT. L. C. pp. 180, 181, 184.

“ When carried to a considerable extent, so as to bring the system under its influence, it occasionally induces faintness, and a degree of nervous irritation or restlessness, with sometimes a coppery taste in the mouth, and an increased discharge of saliva, but without the mercurial factor of the breath. — These effects are very fugitive, and *uncertain*. I have known it to produce a general itching all over the body, and, in some cases, a considerable degree of pain in the soles of the feet. In a few cases a papular eruption over the whole skin succeeded.” JOHNSON, L. C. p. 112.

“ There are very obvious constitutional effects arising from this bath: it produces bilious stools, oppression, and headach; the patients become thin from the long use of it. We have seen salivation and sore gums produced in two instances. Uniformly after its use, the patients have become more plump, and confessed themselves better in health: it will sometimes bring on the menses, or make them more profuse.” C. BELL. L. C. p. 360.

nitro-muriatic acid mixture, stimulates the skin, and rouses those properties of this organ, upon which its powers of receiving the impression of medicines depend. In the same way also do I explain another fact of a similar kind, which I have often observed. If the water, with which the nitro-muriatic acid is diluted, be warm, the mixture will, in consequence, act with more certainty on the system; the heat having the effect of increasing the sensibility of the skin to the action of the chlorine.

Let me here observe, that, although the advantages which may be derived from chlorine, used in the manner which I recommend, are incalculably greater than those that can be obtained from nitro-muriatic acid employed in any form, I have no wish whatever to see this last mode of using chlorine entirely abolished. There may be cases, in which it will answer better than the other. For instance, it will be more easily employed among children;* and it may be within

* I have often used a very *diluted* solution of this acid for sponging the surface of children, and even of infants. I have never observed any inconvenience whatever from its employment; and, on several occasions, most salutary effects have resulted. I have at this moment in my recollection a child, whose life, I feel convinced, was saved by it. When I saw it first, it was thin, its flesh flabby, its lower limbs miserably spent, its

the reach of a patient, when the other cannot be procured.* But there are occasions when the nitro-muriatic acid can never be substituted either by bath or by sponging for fumigations with chlorine. Thus in many cases the acid will either produce no effect, or one too trifling to influence the disease; and here the gas can be had recourse to with certainty. Moreover, I conceive that there are particular advantages arising from the influence of the aqueous vapour or heated air, with

abdomen tumid, great appetite, very imperfect digestion, the food for the most part passing off nearly unchanged, and the biliary secretion exceedingly out of order, as was proved by the extremely dark and unnatural appearance which its discharges constantly had. The skin was in such a state of atony, that it was nearly impossible to keep it at a natural temperature. In the course of three weeks, there was as remarkable an amendment as I have ever observed; and, in less than six weeks, the child was perfectly restored, and is now an extremely fine boy of his age.

* When I use the nitro-muriatic acid, my conduct is regulated by the following directions:— “ Into a glass vessel, capable of holding a pint or more of fluid, put eight ounces of water, and then pour in four ounces of the nitric acid of the London Pharmacopœia, and four ounces of muriatic acid, or the spirit of salt of the shops. This mixture may be labelled the “ nitro-muriatic solution,” and one ounce and a half to a gallon of warm water, will form a bath of medium strength. The proportion may be increased to two ounces, or diminished to half an ounce of the solution to the gallon of water, according to the age, strength, delicacy, or other peculiarity of the patient. A bath of two gallons and a half, is generally sufficient for the feet and legs. A narrow and deep wooden bucket is best; such as will bring the water well up to the knees, without requiring more than eight or ten quarts of liquid. The feet and legs of the patient ought to be immersed in this bath, at a comfortable

which the chlorine is diluted when it is employed in the gaseous form, that, of course, can never be obtained from the acid bath or embrocations; and I have every reason to suppose that these advantages are, oftentimes, of the very first importance in the treatment of disease. Indeed, unless I am greatly mistaken, chlorine gas will, from henceforward, be much employed in conjunction with heated air or aqueous vapour merely as a general cutaneous stimulant; and, for this purpose, it will be found superior, on several occasions, to many others, even to sulphureous fumigation.*

warm temperature, say 96 degrees, and kept there twenty minutes or half an hour, just before going to bed. This may be done every night or every second night, and the same bath will remain good for three or four nights. It ought to be kept in the wooden bucket, and a fourth part or so warmed up, every time it is used, in a well-glazed earthen vessel, and added to the rest, which will make the whole of a sufficiently warm temperature. Or a fourth part of the bath may be thrown away, and a fourth part of fresh hot water added, and an ounce of the nitro-muriatic solution, which will obviate the possibility of any decomposition taking place by glazed vessels."

"As sponging the body with the N. M. water has nearly the same effects as the foot-bath, a small quantity may, at any time, be easily prepared, by adding two drachms of the "nitro-muriatic solution" to each pint of warm water in a common wash-hand basin. By means of a large sponge, the thighs, legs, stomach, chest, or arms, may be wetted with this mixture for ten or fifteen minutes daily; or the above mentioned parts may be sponged alternately."—JOHNSON, L. C. pp. 111, 115.

* It is remarkable, that some of the effects which are produced by the action of chlorine on the skin, are very similar to those which result from the employment of sulphureous fumigations, as may be seen by referring to my publication on that subject.

Much has been said respecting nitro-muriatic acid, and similar remedies as substitutes for mercury, and we are even told that it was with the view of discovering a substitute for this valuable mineral that those trials were made, which finally led to the employment of the nitro-muriatic acid.* In my opinion there can be nothing more unscientific, nor more calculated to prevent the introduction of these remedies into general practice, than such views respecting their mode of action, and influence over disease.† I therefore need

* See in the Annals of Medicine for the years 1796,7, an "Account of the Effects of the Nitrous Acid on the Human Body, extracted from the Bombay Courier, April 30, 1796, and transmitted as a Letter to Sir JOSEPH BANKS." And "Letters from G. KELLY, respecting the Effects of Nitrous Acid in the Cure of Syphilis." See also the following works :

"Reports principally concerning the Effects of Nitrous Acid in the Venereal Disease, by THOMAS BEDDOES, Bristol, 1797;" and by the same "A Collection of Testimonies respecting the Treatment of the Venereal Disease by Nitrous Acid, London, 1799."—ALYON "Essai sur les Propriétés Médicinales de l'Oxygene, et sur l'Application de ce Principe dans les Maladies Vénéériennes, &c., Paris, 8vo. An. 5."—CALDWELL'S Medical Thesises, Philadelphia, 1805 ;—"Medical Histories and Reflections, Vol. 3." by Dr. FERRIER.—HOLST. "Diss. de Acidi Nitrici Usu Medico; Christ. 1816."—"An Account of two Cases of Diabetes Mellitus, with Remarks, &c. by JOHN ROLLO, M. D. Vol. 2. 8vo. London, 1797."—HUFELAND'S "Journ. der. Prakt. Heilk. Vol. 20."—MUNCHMEYER, "Comm. de Viribus Oxygenii in procreandis et sanandis Morbis. Goet. 1801."

† "The inflated eulogiums bestowed upon the operation of *digitalis* in pulmonary diseases, excited for some time a very unfair impression against its use; and the injudicious manner in which the antisiphylitic

not inform the reader, that I do not consider chlorine a substitute for any other agent. It is true, that there is some similiarity in the effects which mercury and chlorine produce. They have both the power of acting in a remarkable manner on all the secretions, but more particularly on those of the liver and salivary glands. There are also some other circumstances, in which their actions on the body resemble one another; as may be seen by comparing the effects, which I have described to arise from chlorine, with those that are known to result from the operation of mercury. But, is it because there is this similarity, in respect to the parts on which they act, that we should consider

powers of *nitric acid* have been aggrandized, had very nearly exploded a valuable auxiliary from modern practice."—See PARIS'S "Pharmacologia," p. 28.

It is not without much regret, that I observe in this useful author a contradiction of himself, respecting the powers of the nitro-muriatic acid, which savours a little of illiberality. Thus, at p. 26, we meet with the following passage:—"In short, we shall find an unbounded credulity with respect to the powers of *inert substances*, from the elixir and *alkahest* of PARACELsus and VAN-HELMONT, to the tar water of Bishop BERKLEY, the metallic tractors of PERKINS, the animal magnetism of Miss PRESCOT, and may I not add, with equal justice, to the nitro-muriatic acid bath of Dr. SCOTT?" Yet, at p. 228, as if desirous of retracting what he had previously said, or as if it had escaped his recollection. he remarks, when speaking of the same remedy, "On the possible influence of this bath, I would beg to make one observation, that the extensive application of a dilute acid to the surface of the body is *capable of affecting the bowels.*" Again, "In this way the acidulated bath may occasionally produce benefit, but it is extremely difficult to conceive

their operation the same, or that we should expect the one to serve the purpose of the other? As well might we say that every remedy, which influences the stomach in particular, has a similar action, and that the one might be used for the other. If such reasoning was founded in nature, the articles of our *Materia Medica* need not be very numerous. Or is it because there is a similarity among some of the diseases, which they are calculated to relieve, that we should consider them the same? How absurd would such a supposition be! Because the same disease is curable by different means we are to consider these means as similar! The value of mercury is too well known, and the powerful and salutary effects

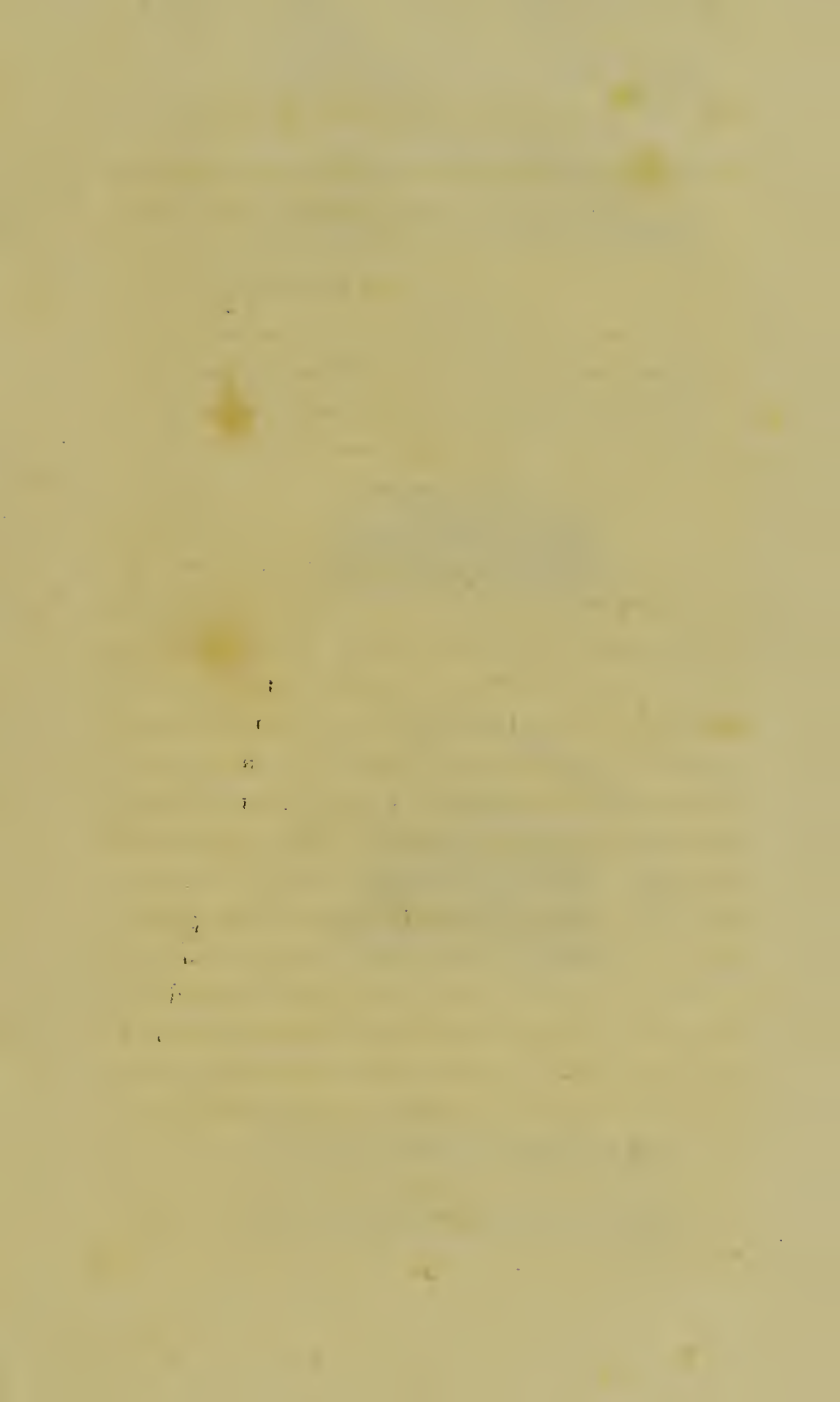
how it can be indebted for its utility to any other mode of operation." Thus, while he in one place classes this valuable remedy among the conceits of quacks and enthusiasts, he admits in another its "*possible influence*;" that it is "*capable of affecting the bowels*;" that it may "*occasionally produce benefit*;" and then he makes a most extraordinary remark, that it is "extremely difficult to conceive how it can be indebted for its utility to any other mode of operation"—than what? "than *its powers of affecting the bowels*." Does he forget that it is in this very way that almost all our efficient remedies act? However, even if it should be difficult to conceive to what it can be indebted for its utility, we are not, on that account, to deny its efficacy. As Mr. C. BELL says, "What although witnessing such effects of a remedy, we were to be left disputing about the action of the medicine, or the nature of the disease. Of how little real consequence is this difference of opinion?" L. C. pp. 558-9. Let Dr. PARIS try the medical powers of chlorine, in the manner in which I employ it, and he will no longer place it among "*inert remedies*," nor talk of "*its possible influence*."

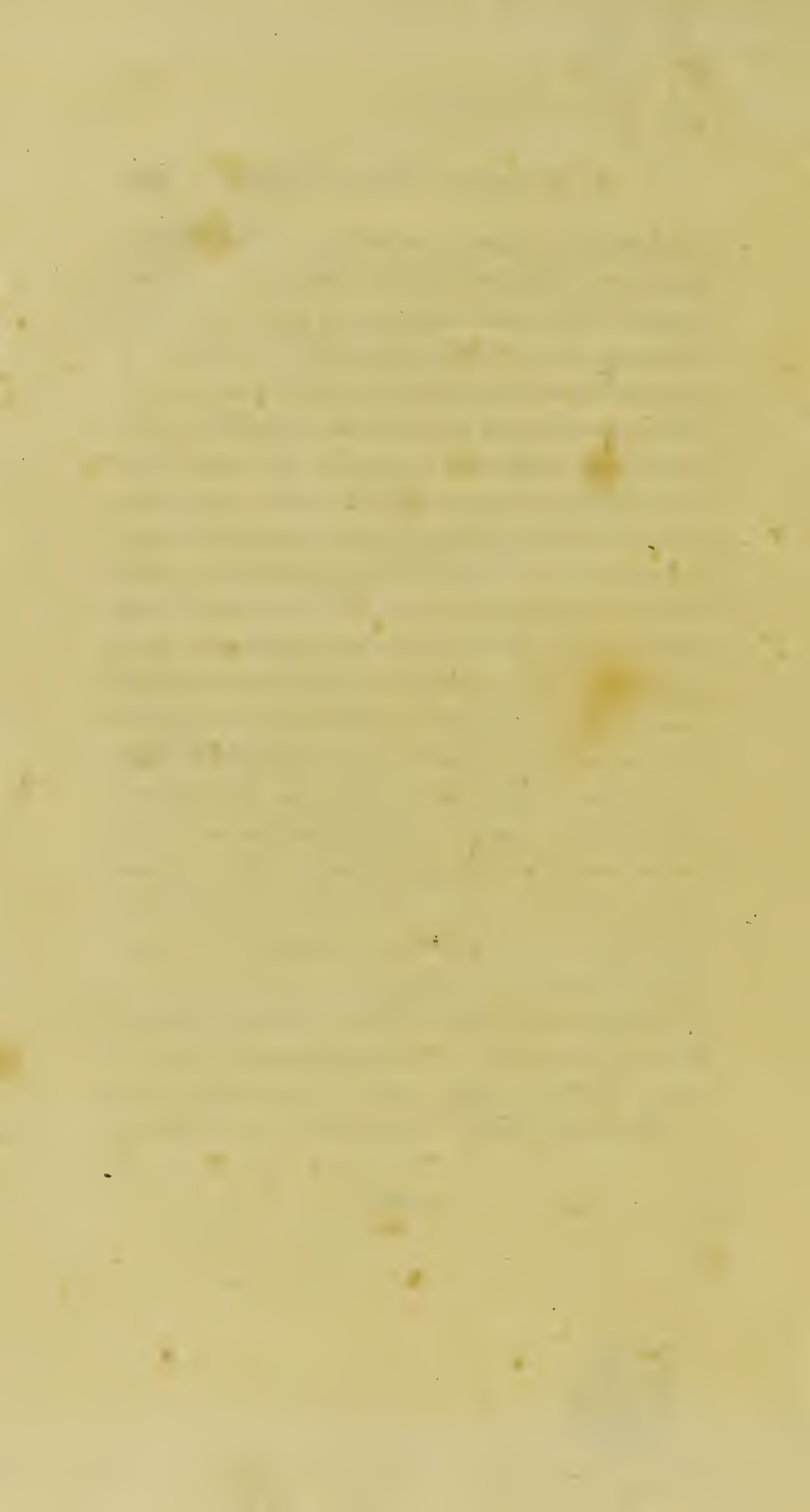
which it is capable of producing, when carefully administered, can probably never, in every respect, be secured by any other remedy. Let this agent hold its ground : the catalogue of human maladies is unfortunately much more than sufficient to leave room for the operation of another remedy, without dispossessing any medicine of its well earned and deserving rank in the treatment of disease. I conceive I do more to excite practitioners in general to the employment of chlorine by proving, that, although it cannot serve as a general substitute for mercury, it may on many occasions be used in place of this mineral, as other remedies may be employed instead of each other, and that very frequently it will afford the greatest assistance, when we could not obtain relief from any other source ; and this in those very cases for the cure of which we may have tried mercury in vain.

In conclusion, it is scarcely necessary to inform the reader, that this publication does not at all pretend to be a complete investigation of all the medical properties of chlorine. He is of course well aware, that it is entirely beyond the reach of any individual, however zealous, to investigate the powers of even a single remedy in all its bearings, if that remedy be one of extensive operation, and, consequently, applicable to the treatment of many diseases. Nor must he suppose, that I come

forward with chlorine as a *specific* in hepatic affections. The time, it is to be hoped, has nearly passed by, when practitioners were idly engaged in seeking for *their* philosopher's stone, (specifics for the relief of disease,) for it is now pretty generally established, that morbid states of the constitution must be combated according to general principles; and, although it may be possible, that there are certain remedies, which have a specific effect on certain diseases only, it is beyond a doubt that such are not as numerous as we formerly supposed: and perhaps they will be found still less numerous according as our knowledge of the mode of action of medicine advances towards perfection. I use chlorine, and I recommend a trial of it, on general principles; and, if employed on such principles, I assert that it will be found a most valuable agent in the practice of medicine. In short, my object cannot be mistaken. It is solely to communicate to the profession such facts as may induce them to put this new and valuable remedy fairly and carefully to the trial of general experience: that test by which the importance of every new proposal in the practice of medicine must be finally estimated.

FINIS.





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